Cooperation in the European Mountains 2: The Caucasus

Edited by Martin F. Price

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Cooperation in the European Mountains

2: The Caucasus

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European Regional Office

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Foreword

This report has been prepared as a contribution to Action Theme 10 (mountain ecosystems) of the Pan-European Biological and Landscape Diversity Strategy (PEBLDS). The financial support for this activity, provided by the Netherlands Ministry of Agriculture, Nature Management and Fisheries, is gratefully acknowledged.

Over the period 1996-2015, the goal of the PEBLDS is to achieve the conservation and sustainable use of biological and landscape diversity for the whole continent of Europe and all its regions. Its aims are to:

- substantially reduce, or where possible remove, the threats to Europe's biological and landscape diversity;
- increase the resilience of European biological and landscape diversity;
- strengthen the ecological coherence of Europe as a whole;
- increase considerably public involvement and awareness concerning biological and landscape diversity issues.

These aims are being implemented through four five-year Action Plans. In the 1996–2000 Action Plan, a total of eleven Action Themes were outlined. Action Theme 10 considers mountain ecosystems and, under this, ten activities (or sets of activities) were initially proposed for implementation, under the leadership of IUCN's European Programme. These activities were very diverse, reflecting the negotiation process that took place during the process of drafting the PEBLDS before it was endorsed by the environment ministers of 55 countries at the third 'Environment for Europe' conference in Sofia, Bulgaria, in 1995 (Price, 1999).

At its meeting in November 1996, the Executive Bureau of the PEBLDS gave priority to two activities within Action Theme 10. The present report derives from Activity 10.6: 'the potential application of mechanisms such as the Alpine Convention and its protocols and observation systems to other mountain ranges'. This activity recognises the strong cultural and economic ties within each of Europe's mountain ranges and the need to ensure effective management of environmental resources across national boundaries. Consequently, mechanisms for cooperation at the scale of entire mountain ranges, whether through formal agreements or through regional institutions, seem desirable. As such mechanisms are best developed in the Alps, the first work undertaken to implement this activity was the preparation of a report on cooperation in the Alps, published as the first report in this series (Price, 1999). This provides an overview of existing mechanisms, and evaluates their potential for application in other European mountain ranges.

In the Caucasus, the subject of this second report in the series, mechanisms for cooperation are at a very early stage of development. Unfortunately, the region is generally better known for conflict than cooperation. Yet the Caucasus is a major centre of biological, landscape, and cultural diversity; appropriate mechanisms to maintain and foster these various types of diversity - which are intricately linked – are urgently needed. As a first step towards considering the establishment of such mechanisms, the present report provides both an overview of the Caucasus – including both the mountains and the lower lands within the different administrative and national entities – and details of existing structures for cooperation at all levels. Finally, a list of governmental and non-governmental organizations in the region is provided.

I would like to thank Yuri Badenkov (Institute of Geography, Russian Academy of Science) and Vladimir Moshkalo (IUCN Representative Office in Russia) for coordinating the compilation of the report, and organising its translation into English. It is also being published in Russian, to ensure that the knowledge it contains is widely available in the Caucasus itself. I hope that it will serve as an important first step towards future activities in the cooperative spirit of the PEBLDS, to the benefit of both the people of the Caucasus and those concerned with the maintenance of the diversity of the highest and most southeasterly parts of Europe.

Martin F. Price, Oxford, March 2000

Reference

Price, M.F. (1999). *Cooperation in the European Mountains 1: The Alps.* IUCN, Gland and Cambridge.

1. Introduction

As a geographic, historical and cultural phenomenon, the Caucasus covers a vast area between the Black Sea to the west and the Caspian Sea to the east. In the Russian literature, it is primarily recognised as the mountainous region which separates the great Russian plains from the high plateaux of Asia Minor.

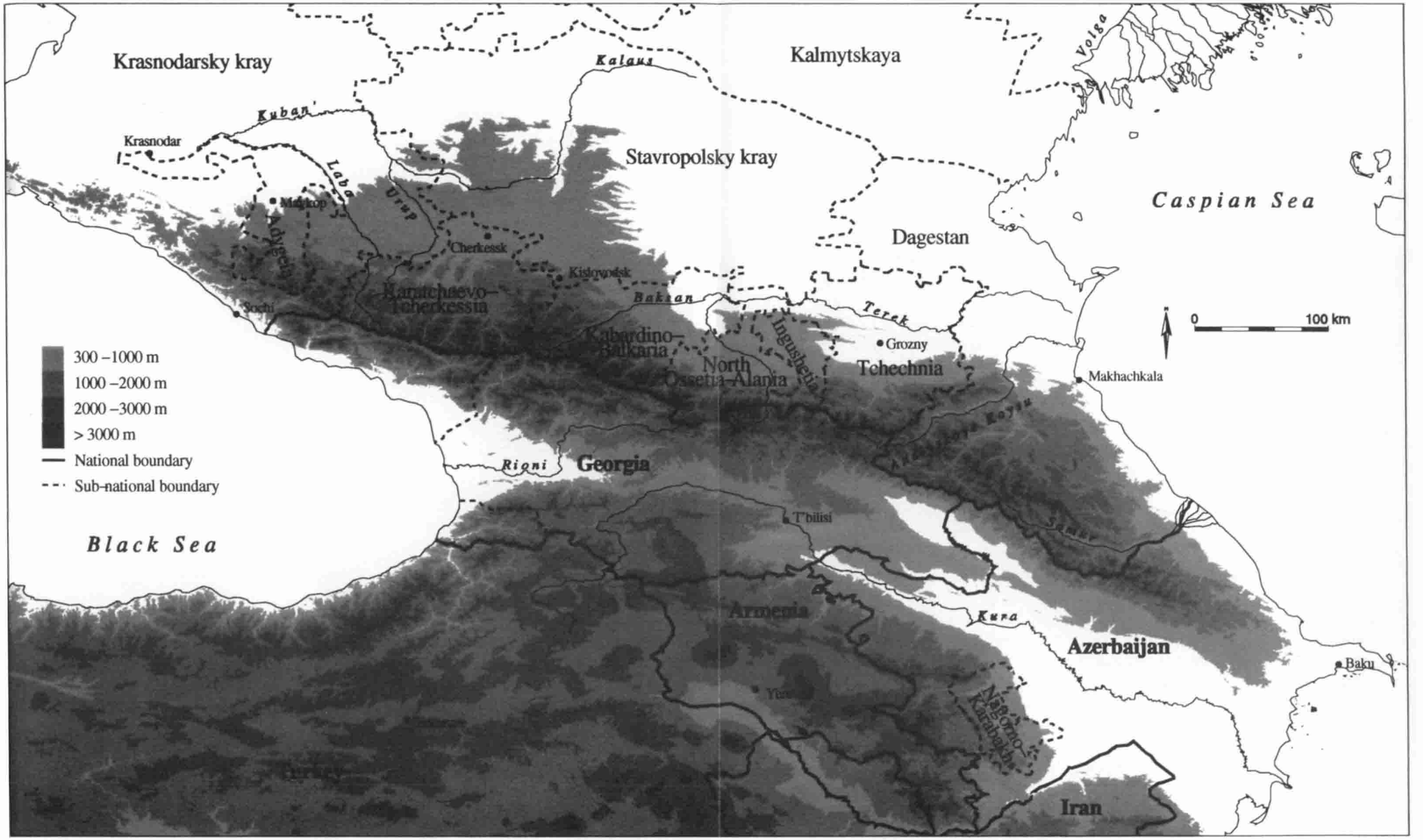
The largest orographic elements of the Caucasus are, from north to south, the Pre-Caucasus plains (part of the Russian plains), the Caucasus mountains, and the Transcaucasus. On the northern Caucasus macro-slope are situated several republics and krays which form part of the Russian Federation: the republics of Dagestan, Tchechnia, Ingushetia, Northern Ossetia-Alania, Kabardino-Balkaria, Karatchaevo-Tcherkessia, and Adygeia; and Stavropolsky and Krasnodarsky krays. Azerbaijan, Armenia and Georgia occupy the southern macro-slopes of the Great Caucasus, as well as the mountains and plateaus of the Transcaucasus (Map 1).

From west to east, the Great Caucasus (Gvozdetsky, 1987) is divided into three parts: the Western and Central Caucasus are divided by the valley of the Baksan river; and the Central and Eastern Caucasus by the valley of the Terek river. The highest peaks are in the Central Caucasus; Elbrus (5,642 m) is the highest mountain in Europe.

For centuries, the Caucasus has been the scene of great inflows and outflows of people, from time to time moving along its northern and southern slopes from west to east or vice versa. The Caucasus has always been the area of confrontation of the most ancient cultures and civilizations: Indo-Arian, Greek, Byzantine, Mongolian, Osmanic, Slavic, etc. The high mountains have also provided asylum for refugees from the adjacent lowlands (the predecessors of the modern Ossetins or Alany) or were mercilessly plundered by aggressive mountainous tribes that collected contributions from trade caravans and peaceful nomadic cattle breeders and farmers.

The history of the development of the Caucasus, where the culture and traditions of indigenous nomadic tribes mixed with those of the alien tribes arriving from the plains, has resulted in a patchy ethnic and religious landscape. Here Islam and Christianity, Paganism and Judaism co-exist within a limited space. Yet, the region has always been the scene of confrontations between the interests of many countries and peoples - from Mongolian invasions to the confrontation between Russia, Persia, Turkey and other countries - with many military conflicts, social tension and confrontation between indigenous peoples and tribes. Military conflicts in Nagorny Karabakh, Southern Ossetia, Abkhazia and the on-going war in Tchechnia have added the list of the "Caucasus wars" as the second millennium ended. These phenomena continue to affect the rich landscape and biological diversity of the Caucasus.

The Caucasus is situated at the junction of the temperate and sub-tropical zones and is affected by both Atlantic air masses and the dry continental



Map 1: The Caucasus

climate of continental Eurasia. Both this factor and the complicated history of the development of the Caucasus have determined the remarkable richness of its flora and fauna and the diversity of landscapes and types of ecosystems. Here one can see plants and animals typical of European broadleaf forests and meadows, Central Asian plains and deserts and, in places, Alpine and Carpathian landscapes.

The Caucasus flora is one of the richest at these latitudes on Earth, with 6,350 species (Zimina, 1980). In terms of the number of vascular plant species, the Caucasus is a global centre of biodiversity (Barthlott *et al.,* 1996), with 15 endemic genera, of which nine only occur in the high mountains. The fauna is also very rich and diverse. Land vertebrates have been particularly studied: there are 130 species of mammals, 360 of birds, 57 of reptiles, and 14 of amphibia.

The Caucasus flora and fauna include many endemic species, both ancient Tertiary and younger species of early Quaternary periods. The highest percentage of endemism occurs in the high mountains and xerophytic mountain vegetation formations. The number of endemic species among animals is also very high, notably about 75% of the land molluscs in the subalpine and alpine belts. This can be explained by the region's isolation, surrounded by seas and dry areas of southeastern Europe, Iran, and Asia Minor. Natural ecosystems range from alpine and subalpine meadows; to dark-coniferous, beech, subtropical, white beech/oak, and sparse arid forests; to plains, semi-deserts, and deserts.

1.1 Specially protected natural areas

The establishment of reserves and other types of specially protected natural areas (SPNAs) in the mountain regions of the former USSR – and particularly in the Great Caucasus – was usually based on the principle of "priority for unique high mountain ecosystems", mainly given to subalpine and alpine ecosystems. They are characterized by the largest number of endemic species of flora and fauna, and are totally different from their plains counterparts with respect to certain structural and functional indicators and genetic features. Consequently, most of the reserves in the Russian part of the Great Caucasus are along its axis, in the high mountains which have relatively homogeneous natural conditions along the entire Main Caucasus range. It should also be noted that the principle of "priority for nature conservation in the high mountains" related not only to the natural uniqueness of the high mountain ecosystems, but also to the fact that the entire lowlands have been greatly modified by human activities. For the same reasons, there are no reserves in the high mountains of Dagestan.

These trends have had two particular results. First, in the landscapes of the middle mountains and, particularly, the low hills and foothills which were most modified by people, almost no reserves with the required strict protection regime have been established. In the existing sanctuaries, the use of natural resources is not excluded; only formally do they belong to the category of protected areas. Second, a large proportion of the area of certain SPNAs is "lifeless" or difficult terrain (rocks, rocky wastes, glacio-nival landscapes) with almost no biota, while much more valuable landscapes in need of protection - especially mountain forests – are underrepresented. This situation is particularly acute, for instance, in the Kabardino-Balkarsky reserve where rocky wastes, sub-nival and glacio-nival landscapes account for almost 55% of the area, but forest landscapes occupy less than 4.5%.

Another problem is related to the delimitation of the boundaries of protected areas. These are frequently set rather arbitrarily, are not congruent with natural borders and, in the best cases, correspond to the axial parts of river valleys. Usually they conform to land use or administrative boundaries. This situation is particularly typical of the Russian part of the Great Caucasus, especially the Northern Caucasus.

1.2 Regional cooperation

Regional cooperation at the inter-state level on issues relating to landscape and biological diversity conservation is mainly limited to information exchange and occasional consultations. Existing programmes of transboundary protected area establishment (e.g., between Georgia and Dagestan) have not yet attracted their long-deserved attention. The initiative of conducting a Caucasus Ecological Forum proposed by the Parliament of Georgia in 1997 has not yet been implemented. Taking into account the increased activity of some of Georgia's non-governmental organizations engaged in the sustainable development of mountainous regions, we may hope that the newly elected Parliament of Georgia will continue its efforts to foster inter-state cooperation in the Caucasus. In this respect, the meeting at Gudauri, Georgia in April 2000, organised by the Georgian Union of Mountain Activitists, may start the process of collaboration between the trans-Caucasus states of Armenia, Azerbaijan and Georgia and the Caucasian entitities of the Russian Federation.

Within the Russian Federation, an inter-regional agreement between the entities of the Russian Federation has instituted the Association of the Northern Caucasus regions. This is responsible, besides economic and social issues, for environmental protection. In addition, in 1992, 1996, and 1998, the Republic of Northern Ossetia-Alania organised conferences on sustainable mountain development.

Unfortunately, the lack of possibilities for electronic communications between north and trans-Caucasian regions creates challenges for information exchange and co-operation. Another complication is created by language. While the trans-Caucasian republics use English more and as the official communication language (especially for electronic communication services and the Internet), the North Caucasian republics and krays, as members of the Russian Federation, still use Russian.

The lack of institutional frameworks and existing environmental regulations is the biggest challenge in all of the countries of the region. In addition to this, new territorial entities, newly established states, political borders and differences in national constitutions create barriers for regional cooperation. Political conflicts of interests are also a problem. To remove these barriers, it is extremely important to involve different social groups (such as NGOs, public organisations, local administration) in the process of consultation and partnership. The first step is information and communication networking.

In conclusion, while there are many challenges to resolve, integration and inter-state cooperation in the field of landscape and biological diversity conservation, the establishment of a regional network of protected areas, and the organization of a system for information exchange should be key components of implementing both *Agenda 21* and the *Pan-European Biological and Landscape Diversity Strategy* in the Caucasus.

2. Armenia

2.1 Introduction

The Republic of Armenia is situated in the southern part of the Transcaucasus and occupies 3 million ha (28,700 sq km) in the north-eastern part of the vast Armenian highlands and Lesser Caucasus ranges. Armenia is 360 km from northwest to southeast and 200 km from west to east. It has common borders with Georgia, Azerbaijan, Iran, and Turkey.

The population is 3.7 million. About 700,000 people have migrated from the country. Population growth is 0.4% per year. The population density varies from 30 to 257 persons per sq. km. The regional distribution of the population is shown in Table 2.1.

Table 2.1 Administrative units and population distribution in Armenia

Region (oblast)	**Population (000)**	**Area (sq. km)**
Yerevan	1249.7	227
Aragatsotn	163.2	2,753
Ararat	306.4	2,096
Armavir	316.7	1.242
Gekharkunik	273.5	5,348
Lori	392.8	3,789
Kotaik	326.0	2,089
Shirak	358.8	2,681
Siunik	162.3	4,506
Vaiots-Dzor	68.5	2308
Tavush	155.1	2,704
Total	**3773.6**	**29,743**

2.2 Landscape and biological diversity

2.2.1 Landscape diversity

Armenia is a combination of folded, folded-block and volcanic mountains, alluvial plains and highland lava plateaux, narrow river valleys, and lake canyons. The average altitude is 1,800 m, with more than three-quarters at altitudes from 1,000 to 2,500 m. The highest peak is Aragatz (4,090 m), and the lowest points are in the Debed river canyon in the north and in Arax river in the south: 400 m below sea level.

There are three basic forms of relief: inter-mountain canyons, volcanic plateaux and folded mountains. The integrated relief structure which characterizes all of Armenia is created by high altitude belts, the formation of which was facilitated by the complexity of relief and the range of altitudes. The eight major landscape zones are briefly described below.

- Deserts occupy a small part of the Ararat plains. Most common are relophite and gypsophile deserts.
- The semi-desert zone occupies the Ararat plains and the adjacent foothill areas up to 1,200-1,300 m, parts of the Vaik lowland and a narrow coastal strip of the Megri canyon.
- The dry plains zone is located in central and southern Armenia at altitudes from 1,200-1,300 to 1,500-1,600 m. In Siunik and the extreme northeast, this zone is found at altitudes up to 800-900 m.
- The mountain-plains zone occupies the greatest proportion of the Republic. It starts at 1,500-1,600 m and reaches altitudes of 2,000 m and, in the south, 2,500 m. In Siunik and the extreme northeast, forests are also found at these altitudes. In its lower parts, the zone is typically plains-type and, in its upper parts, meadow plains-type.
- The forest zone is widespread at altitudes from 500-700 to 2,100 m in the north and up to 2,500 m in the south, principally in Lori, Tavush and Siunik oblasts. Forests cover the northern slopes; the southern slopes are predominantly occupied by plains. In central Armenia, these landscapes do not make up a single belt and remain in the form of separate islands in Vaik, the Sevan lake basin, Marmarik river valley, etc.
- The subalpine meadow zone is above the forest and plains zones at altitudes from 2,400-2,500 to 2,600-3,000 m, including the highland parts of ranges.
- The alpine meadow zone forms a distinct belt at 2,700-3,500 m and up to 4,000 m on Mount Ararat.
- The nival zone, with perennial glaciers, is found on the highest ranges of the Republic: Aragatz, Ajdaak and Kaputdjukh. The average annual temperature is below –4°C.

Azonal landscapes account for about 10% of the Republic's area. They include solonchaks on the Ararat plains, as well as high and low wetlands.

High-altitude freshwater wetlands form small habitats in the Lori, Ashotsk and Sevan lake basins. Low wetlands are located along the banks of Arax river forming small habitats. Small sand deposits along the Arax river are also regarded as azonal.

2.2.2 Floristic diversity

Armenia is situated at the juncture of the Circumboreal and Irano-Turansky botanical and geographical regions. This, together with the wide variety of physical and geographical conditions, has resulted in the presence in a small part of the Armenian highlands of a rich flora and vegetation associations, whose diversity is further linked to the altitudinal zonation: more than 3,300 species of vascular plants belonging to 130 families and 800 genera, including 106 endemic and about 200 relic species (Table 2.2). The Red Book of Armenia includes 387 rare and disappearing plant species.

Table 2.2 Taxonomic characteristics of Armenia's flora

	Number of species
Algae	143
Fungi	4,166
Lichen	300
Moss	395
Vascular plants including	
Lycopodium	2
Equisetum	6
Ferns	38
Gymnospermae	9
Angiospermae	3,300

Desert vegetation is represented by the phytocenoses of the hammada: a peculiar combination of open phytocenoses of desert type with small bushy *Salsola* or fragments of phryganoid (dry shrub) phytocenoses. Phytocenoses of the southern Armenian hammada are the remnants of such vegetation which is widely distributed in Afro-Asian deserts.

Semi-desert vegetation includes wormwood and grassy-wormwood semi-desert and, despite the dryness of the habitat, has a rich species composition.

The phryganoid vegetation belt or arid sparse forest belt is represented by pillow-like dwarf shrubs and semi-shrubs as well as small trees: *Amygdalus fenzliana, Celtis caucasica, Rhamnus pallasii, Pyrus salicifolia,* etc. The grass cover is dominated by different ultra-xerophytic perennials. The sparse forests consisting of *Juniperus polycaros, J. sabins* and *J. oblonga* are particularly notable.

Plains vegetation is the most typical type of vegetation in Armenia. There are ten types (feather grass, fescue, wheat grass, Agropyrons, Cheledonium, sedge, wormwood, beans, mixed herbs-grassy and tragacanth) which frequently form intermediate phytocenoses. Together with other types of plains vegetation, they form a number of transitional communities: meadows-plains, forest plains, desert plains, etc. Many of Armenia's plains and meadow plains are of secondary origin. There is considerable evidence that many areas which are occupied today by plains vegetation were previously covered by forests.

Armenia's forests are broadleaf mountain forests. Although the forests cover only 10% of the total area of the Republic, their composition is very rich and diverse, with more than 260 species of trees and shrubs. The main forest-forming species include *Fagus orientalis, Quercus macranthera, Q. iberica,* and *Carpinus caucasica.* A relatively small area is covered with white beech, ash, elm, and pine forests. Valuable species include *Taxus baccata, Juglans regia, Platanus orientalis, Corylus colurna,* and *Quercus araxiana.*

Subalpine vegetation is characterized by a very rich species composition, including three groups of elements. Representatives of the first group grow only in this belt, forming the nucleus of the subalpine vegetation. They include *Anemone fasculana, Betonica grandiflora, Cephalaria gigantea, Galega orientalis, Valerianella pubescens,* and *Heracleum trachyloma.* The second group includes species from lower altitude belts, and the third includes those descending from the higher alpine belt. The latter group includes moisture-loving plants such as *Betula litvinovii, B. verrucosa, Acer trautvetteri, Ribes alpinum, Padus racemosa, Rubus idaeus, Rhododendron caucasica,* and *Vaccinium myrtillus.*

Alpine vegetation is distinguished by a low-growing vegetation cover consisting of dwarf dicotyledonous herbs. The most common species include *Campanula tridentata, Nardus glabirculmis, Pedicularis armena, Poa alpina,* and *Gentiana gelida.*

2.2.3 Fauna diversity

Armenia's fauna is rich and diverse, with 521 species of vertebrates (including 83 species of mammals, 349 of birds, 53 of reptiles, 8 of amphibia, and 28 of fish) and about 17,000 species of invertebrates. For many centuries, Armenia's fauna has been seriously affected by human activities and many animal species have practically disappeared.

Many species of animals are registered in the IUCN and USSR Red Books. The Red Book of Armenia includes 99 vertebrate species, the Red Book of Russia 39, and the Red Book of IUCN six. In addition, the Red Book of the USSR includes 48 species of invertebrates. Today, there is an urgent need to include 97 additional species in the Red Book. Of 99 species of vertebrates registered in the Red Book of the Republic, 15 are of amphibia and reptiles, and 18 are mammals. Today, many of these species are on the verge of disappearing (Table 2.3).

In southern Armenia, there is a permanent population of *Pantera pardus ciscaucasica Satunin, 1914 syn. P.p. tulliana)*, a first category species in the IUCN Red Book. In the 1960s to 1970s, the number of individuals increased, and others were resettled in the northern parts of the Republic. In the first half of the 1990s, up to five leopards were permanently kept in Khosrovsky reserve. To date, there has been no specific accounting of the number of leopards in Armenia, although provisional data suggest it should be recognised as a disappearing species.

Other predators included in the USSR Red Book include: *Ursus arctos syriacus Hemprich et Ehrenberg (1828); Vormela peregusna peregusna, guldenstaedt (1770); Lutra lutra meridionalis Ognev (1931; Hyaena hyaena Linnaeus (1758)*, the only representative of the *Hyaena* family in the CIS; and *Felis manul Pallas (1776)*, an unusual representative of the cat family.

Of many ungulates registered in the Red Book of the USSR in Armenia are two representatives of the hollow-horned family: *Capra aegagus aegagus Erxleben (1777)* and *Ovis ammon gemelini Blyth (1840)*, hunting of which has been prohibited in Armenia since 1936.

Armenia also has a very rich diversity of bird species. Of particular note are two interesting representatives of *Galliformes*: *Lyrurus mlokosiewiczi Taczanowski (1875)* and *Tetraogallus caspius Gmelin (1784)*. The predatory birds include several species listed in the Red Book of the USSR. From the *Accipiter*, these include *Milvus nilvus Linnaeus (1758), Ciraetus gallicus Gmelin (1788), Aquila chrysactos Linneaus (1758)*, and *Gypaetus barbatus Linnaeus (1758);* and from the *Falconidae*, *Falco biarmicus Temminck (1825)*, and *Falco peregrinus Tunstall (1771)*.

Reptiles registered in the Red Book include: *Testudo graeca Linnaeus (1758), Phrynocephalus helioscopus persicus de Filippii (1863), Lacerts parva Boulenger (1887)*, and *Ablepharus chernovi Darevski (1953)* – a rare

disappearing species which, within the CIS, is known only from the valley of the middle stream of Razdan river in Armenia. Snakes include *Vipera raddei Boettger* (a rare species listed in the IUCN Red Book), *Vipera kaznakowi Nikolsky (1910), Elaphe hohenackeri Strauch (1873)* and *Rhynchocalamus melanocephalus Jan (1862).*

Table 2.3 Species listed in the Red Book of Armenia

	Number of species	**Number of disappearing species**	**Percentage of disappearing species**
Mammals	83	18	21.7
Birds	349	66	18.9
Reptiles	53	14	26.4
Amphibia	8	1	12.5
Birds	28	2	7.1

2.2.4 Protected natural areas and prospects for their development

The history of specially protected natural areas in Armenia began in 1958 with the establishment of Dilijansky and Khosrovsky reserves and a number of sanctuaries by a Resolution of the Cabinet of Ministers in accordance with the "Law on Armenia's Nature Conservation". The total area of Armenia's specially protected natural areas, including the basin of Lake Sevan, is 311,000 ha: more than 10% of the area of the Republic. The terrestrial parts of protected areas occupy about 6% of Armenia's area. In accordance with the "Law on Specially Protected Natural Areas", there are four categories of specially protected natural areas: state reserves, state sanctuaries, national parks, nature monuments. As of December 1998, there were five state natural reserves, one national park, and 22 state sanctuaries.

Dilijansky reserve

Dilijansky reserve was set up in 1958 with the aim of conserving the typical landscapes of the northern slopes of the Lesser Caucasus. It is situated on the spurs of Pambaksky, Basumsky, Murguzsky, and Areguniisky ranges. In 1973, its area was expanded to 23,200 ha (including 20,300 ha of forest); and in the 1980s to 31,193 ha (including 26,742 ha of forest). As of December 1, 1998, its area was 29,196 ha.

The reserve is characterized by highly rugged mountainous relief formed as a result of volcanic activity. Its entire area is dissected by deep ravines and canyons with steep rocky slopes. Altitudes vary from 1,200 to 2,993 m. The highest peaks are Murgus (2,993 m), Soiukh-Bulag (2,673 m) and B. Maimekh (2,642 m). The reserve is crossed by the Axtev river and its four affluents. The rivers are typically mountainous. In the mountains is Parzlich lake.

The climate varies markedly across the reserve, including high-altitude climatic zonality. In the central mountains, the climate is moderate with a small annual amplitude; the summer is cool while the winters are mild.

Most of the reserve is covered by mountain forests (broadleaf mountain forests dominated by oak, beech, and white beech formations). The high-altitude vegetation belts are quite extensive. The lower belt is covered by oak and beech forests. In the subalpine, open forests of juniper and white beech prevail. The main species of trees, in terms of area occupied, are: *Quercus iberica* and *Q. macranthera* (45%), *Fagus orientalis* (24%), and *Carpinus caucasica* (9.4%). There are also small areas covered by *Pinus sosnovskyi Nakai.* Other tree species include *Acer trautvetteri, A. ibericum, A. platanoides, Celtis, Tilia caucasica,* and *T. cordata.* There are also *Pyrus caucasicus, Malus silvestris,* and *Juglans regia.* The understorey includes blackthorn, raspberry, blackberry, and Cornelian cherry. In the Getik river basin, on the northern slope of Akhnabadsky canyon, is a 61 ha relic yew (*Taxus baccata*) grove with a mixture of yew (60-90%) and beech trees. The yews vary in age from 400 to 500 years, with an average height of about 230-260 m and an average diameter of 60 cm.

The fauna include brown bear, Caucasus otter, forest marten, forest cat, and lynx. Ungulates include Caucasus red deer, roe deer and introduced dapple deer. Boar are quite common in the beech forests. The ornithofauna is also rich, with 120 species, including 80 nesting species. They include such valuable and rare species as *Lyrurus mlokosiewiczi, Tetraogallus Alectoris kakelil, Aquila chrysaetos,* and *Aegypius monachus.* Reptiles include *Lacerta, Vipera, Natrix natrix,* and *Elaphe hohrnackeri* – all registered in the Red Book of the USSR. Amphibia include *Rana maloasiatica, R. radibunda, Bofo viridis,* and *Hyla.*

The rivers are inhabited by trout and *khramulia (Vazicorhinus).* There is a very rich diversity of invertebrates, but these have not been yet sufficiently studied.

Khosrovsky reserve

Khosrovsky reserve was founded in 1958 to conserve the typical landscapes of southern Armenia, traditionally inhabited by *Pantera pardus ciscaucasica Satunin, Capra aegagus aegagus Erxleben* and *Ovis ammon gemelini Blyth,* all included in the Red Book. It is located in typical mountainous territory at altitudes of 1,600 to 2,300 m in the Khosrob and Azat river basins. The reserve

consists of a number of clusters; 22,300 ha in 1973, and 29,680 ha in the 1980s. As of December 1 1998, the area was 24,232 ha.

The reserve has a unique collection of flora and fauna species of arid sparse juniper forests, with more than 1,500 plant species, including over 80 endemic species such as *Crataegus armenii* and the disappearing species *Secale vavilovii.* There are three distinct vegetation belts, defined by altitude: semi-deserts, mountain forests, and plains. On flat areas, there are woods of eastern oak, as well as ash, maple, poplar, and walnut. Vast areas are occupied by sparse juniper forests with small numbers of almond, pear, and hawthorn trees.

There are no introduced animals and the fauna is highly representative. The main peculiarity is a comparatively high density of large predatory birds and large animals in a relatively small area. Resident predatory birds include 14 *Accipiter* and five *Falconidae* species, all of which nest in the reserve. They include *Gyps fulvus, Gypaetus barbatus, Aquila, Hieraaetus pennatus, Pernis apivorus, Ciraetus gallicus, Milvus korschun,* Caucasus sub-species of *Buteo* and *Accipiter gentilis, Accipiter nisus,* European tuvik, *Neophron percnopterus* and *Aegypius monachus.*

Amphibia include *Testudo graeca* and *T. caspius.* There are many reptile species, including Armenian kontia, lizard snake, *Vipera berus, V. ursini, V. lebetina,* and *Elaphe hohrnackeri.*

Shikakhokhsky sanctuary

Shikakhokhsky sanctuary (Bartasskaya forest dacha) was established by the Resolution of the Council of Ministers of Arminskaya SSR of October 27, 1975. However, until 1998 it was actually a sanctuary within Kafansky forest farm. It occupies 10,000 ha (1998) on Armenia's southeastern border, in the upper basin of the Tsav and Shikakhokh rivers. In the sanctuary on the floodplain of Tsav river, flowing through the foothills of the northern slopes of Megrinsky range approximately 15-20 km from the Arax river, is a unique relic plane tree (*Platanus orientalis*) grove. The grove is 100-150 m wide and about 60 ha in area. The average age of the plane trees is about 280-300 years, their average height is 30-35 m, and their average diameter is 80 cm. Some trees have a diameter of four metres near their base.

In the lower mountain-forest belt, up to 1,000-1,600 m, are young forests of *Quercus araxiana,* oak and oak-beech forests with *Quercus macranthera.* Higher formations of *Quercus araxiana* occur up to 1,400 m. The central mountain belt up to 1,800 m is covered by highly productive groves and oak and oak-beech forests (*Quercus iberica*). Further up the mountains are sparse forests and, at altitudes of 2,500-3,000 m, mountain plains, sometimes represented by very dry formations with *Astragalus* and *Acanthaliimons.*

The sanctuary's fauna is also extremely rich and diverse. Predators include *Pantera pardus ciscaucasica, Urus arctos syriacus, Martes foina* and *M. martes.* Ungulates include *Capra aegagus aegagus,* roe deer, boar, and

porcupine. The ornithofauna include *Tetraogallus caspius, Tetraogallus alectoris kakelil, Falco peregrinus,* and *Gypaetus barbatus.*

Sevlichsky reserve
The Sevlichsky reserve is a 200 ha reserve-park complex in southern Armenia, in the lower part of Ishkhanasar range, reaching 2,666 m. It was established to preserve the highland Sevlich lake, which is of volcanic origin, and surrounding alpine communities of plants and animals. Sevlichsky reserve is managed by the direction of the reserve-park complex at the Office on Specially Protected Natural Areas of the Ministry of Nature Protection of Armenia.

Erebuniisky reserve
The Erebuniisky reserve (c. 100 ha) is a reserve-park complex not far from Yerevan, at the border of Kotaisky and Araratsky regions, between Mushabuir, Gegadir, and Atzarat villages. It was established to preserve endemic and unique mountain natural complexes including wild cereal species. The reserve is managed by the direction of the reserve-park complex at the Office on Specially Protected Natural Areas of the Ministry of Nature Protection of Armenia.

Sevan national park
Sevan national park was established in 1978 with the aim of the comprehensive organization of nature protection and the institutionalization of tourist and recreational activity connected with the lake and its basin. The national park includes the highland Lake Sevan and parts of its basin. The total area is 150,100 ha: 120,000 ha of lake, and 30,100 ha of adjacent land. In the national park are five protected areas (Artanishsky, Karcakhpursky, Lichsky, Noraduzsky and Sevansky). The main objectives of these reserved areas are to protect 1) the spawning grounds and growth areas of Sevan trout (*Salmo ischchan Kessler (1887)*; an endemic species included in the Red Book of the USSR) and all its ecological races, as well as *khramul (Vazicorhinus)* and *usach (Barbus)*; 2) places where swimming birds nest, rest, and feed; and 3) unique biocenoses that include habitats for porcupine, *Tetraogallus alectoris kakelil, Vormela peregusna,* and *Maries,* as well as plants including *Coronaria volzhskii, Sorbus rooni, S. luristanskaia, S. persidskaia, S. zontichnaia, S. kuznetsovii, S. ayastanskaia, S. aucuparia, Juniperus polycaros, J. sabins* and *J. oblonga.*

The Artanishsky protected area (c. 2,500 ha) is situated on the northeastern bank of Lake Sevan. Within this relatively small area are more than 70 species of plants and animals included in the Red Book of Armenia, 36 species listed in the Red Book of the USSR, and about 30 species registered in the Red Book of IUCN. Migration routes of many birds that cross the territory of the protected

area are closely monitored by international ornithological organizations. Protection is also extended here to alpine vegetation communities adapted to dry climatic conditions. Within the protected area, a nursery has been established for rare and disappearing plant species of the Lake Sevan basin. Some of these species are relics of the Tertiary period. For example, remnant oaks remain from the time when the Sevan lake basin was covered by forests. The Artanishsky protected area also includes the spawning grounds of two races of Sevan ishkhan: winter *bakhtak* and *bodjak.*

State sanctuaries
In addition to the state reserves and the national park, there are 22 sanctuaries with a total area of about 100,000 ha. The most prominent sanctuaries are: "Sparse Juniper forests", "Bears' nut wood", "Banks Pines", "Gorovanskie sands", "Gergersky forest", "Djermuksky", "Gulakaraksky pine forest", "Aragatzky alpine", "Bokhakarsky", "Araratsky cochineal" (managed by the direction of the reserve-park complex at the Office on Specially Protected Natural Areas of the Ministry of Nature Protection of Armenia), "Ankavansky mineral waters" and "Djermuksky mineral waters".

2.3 Human influences on landscapes and biological diversity

It would appear that in no country within the CIS is the problem of species and habitat conservation more acute than in Armenia. The Republic, especially its southern part, has always been characterized by a greater density of species susceptible to extinction than any other region of the former USSR (Pryde, 1987: 27). Leopard, manul, porcupine, striped hyena, plains and forest cat – this is a far from complete list of species which have almost totally disappeared. Its fauna has been extremely negatively affected by the intensive construction of industrial and civil facilities, roads, irrigation channels, swamp drainage, the cultivation of many different types of landscape, and water pollution during the last decade.

The drastic decrease of the level of Lake Sevan has led to xerophytization of the coastal rocks and the disappearance of wetlands. In turn, this has resulted in disappearance of two species of lizards which previously inhabited coastal rocks, and many species of swimming birds, as well as certain species of mammals. According to many researchers, in the last 200 years, the area of Armenia's forests nearly halved due to human action. Inappropriate human activities, combined with the mass destruction of forests, led to considerable convergence of the upper and lower treelines.

Since the early 1990s, specially protected natural areas with unique genetic resources have been considerably damaged by military activities, vandalism by armed groups, and illegal logging. In recent years, both the number and

habitats of many species in the Republic have been modified. The destruction of natural habitats especially affects those species that have narrow habitats and inhabit mainly semi-desert and mountain-plains regions. In Armenia, populations of such species are at the edge of their natural habitats or are isolated from their usual habitat.

In 1992 alone, 25,000 cases of illegal logging were registered. According to data supplied by FAO, the volume of illegal logging was 700,000-1,000,000 m^3 each winter. As a result of mass logging, livestock grazing, and military activities, many species of mammals have left their natural habitats. These include *Vormela peregusna, Martes,* brown bear, *Ovis ammon gemelini, Pantera pardus ciscaucasica,* and forest cat.

Artificial water basins intended for fisheries are vital for conserving the diversity of wetland species and coastal birds. The largest of these basins (3,500 ha) are situated in former solonchaks and in the Araratskaya valley. In the water basin of Armashsky fish farm (1,500 ha), there are about 180 bird species.

2.3.1 The land use system

The Ministry of Nature Protection and the Ministry of Agriculture and Food are responsible for land resources planning and management. These bodies elaborate regulations and submit them to the Government for approval. With their direct involvement, the "Law on Expertise of the Impact on the Environment" and the Land Code of the Republic of Armenia were adopted in 1995. The Ministry of Nature Protection is responsible for monitoring the use of land resources. In addition, the Ministry of the Environment and Natural Resources is responsible for elaborating governmental decisions relating to geological and other processes (landslides, avalanches, etc.) relating to loss, erosion, the improper use of land resources, and the recultivation of degraded land.

In 1997, a set of urgent actions was taken, aimed at the efficient planning and management of land resources. The priority actions elaborated for this purpose are as follows:

1. to conduct land reform in terms of land mapping, compilation of administrative-regional land balances, development of regional construction schemes, and improvement of the legal framework for land tenure;
2. to develop a model of a unified and property cadaster for the Republic, taking into account the peculiarities of modern agricultural industry;
3. to improve the rental and sales process on the basis of well-established regulations, ensuring the efficient use of lands included in the official reserve fund.

2.3.2 Forestry

Armenia has 335,000 ha of forest. The average annual growth is 450,000 m^3 (1999 data). The total stock of timber is 41.64 million m^3, while the average annual growth is 1.35 m^3 per ha (1993 data). The average annual volume of logging (forest restoration, servicing and sanitary logging) is 100,000 m^3. The volume of illegal cutting is 600,000 m^3 a year; about 30,000 ha of the forests have been damaged by illegal cutting.

Until 1995, the forests were managed by the Republican Forestry Industrial Association (RFIA) "Armies" of the Ministry of Agriculture of Armenia. In 1995, the Forest Code of the Republic of Armenia was adopted, the structure of forestry management was reorganized, and a National Forestry Service was established within the Ministry of Nature Protection. Today the Republic's forest fund is managed by the state closed stock company "Armies".

2.3.3 Agriculture

According to 1996 data, 13,866-13,914 sq. km are used for agriculture: about 46% of the Republic's area. Agricultural lands per capita were 0.004 ha in 1989/90 and 0.007 ha in 1992/93. Consumption of fertilizers has decreased in recent years: from 8,300 kg per sq. km of agricultural land in 1990 to 2,500-2,900 in 1996.

According to N. Vavilov's theory, the Armianskoe highlands are one of the main centres of origin of many cultural plants. As attested by Assyrian cuneiform writings, cereals were cultivated in Armenia as early as the XI-VIII centuries B.C. Carbonized remnants of cultivated plants from the V century B.C. found during excavations confirm these writings.

At the present time, the most developed agricultural branches are field-crop cultivation (wheat, rye, pea, kidney beans, lentil, fodder beet, potatoes, tobacco, carrots, etc.), fruit production (grapes, apples, pears, sweet cherry, figs, pomegranate, etc.) and vegetable gardening (radish, onions, garlic, cabbage, tomatoes, sweet pepper, cauliflower, turnip, scallop squash, etc.). Ex-situ conservation of endemic and selected agricultural species as well as in situ conservation (within protected areas) of wild species of plants which are relatives of cultivated species represent important challenges for the Republic.

Archaeological studies have shown that animal husbandry in Armenia was already developed in the Neolithic era, with the breeding of horses and endemic species of sheep and pigs. The cuneiform writings of the Urartu state (XI-VI centuries B.C.) mention practically all the species of agricultural animals that are currently raised in Armenia. There has been intensive genetic selection since 1930, using the rich local genetic resources. Today, the priority sectors of animal husbandry include beef and dairy cattle, and sheep and pig breeding. Poultry farming is mainly focused on the production of eggs, meat

and feathers. The applied areas of animal husbandry are horse breeding, rabbit cultivation, and fur animals. Beekeeping is also well developed.

2.4 Institutions for landscape and biological diversity conservation

The management and control of landscape and biological diversity conservation are ensured by the Ministry of Nature Protection. In 1997, as an urgent measure to improve state control of specially protected natural areas (SPNAs), *inter alia* for the provision of qualified management of the state reserves and natural parks, an Office on Specially Protected Natural Areas was established within the Ministry of Nature Protection. This has been entrusted with all the functions related to direct management of the Republic's SPNAs, transferring under its authority all state natural reserves, the national park, and some sanctuaries.

The structure of the Office on Specially Protected Natural Areas of the Ministry of Nature Protection (with the number of personnel shown) is as follows: Central administration, 37 persons; Khosrovsky state reserve, 82; Dilijansky state reserve, 81; Shikakhokhsky sanctuary, 30; Sevan national park, 290; reserve-park complex, 72 (Erebuniisky and Sevlichsky reserves, Ararat cochineal sanctuary, Djrvezhsky forest park); Egvardskoe state forest rehabilitation farm, 30; Research centre, 73 (Research division; Stepanavansky; Shamshadinsky, Vanadzorsky, and Idzhevansky dendroparks).

It is necessary to note the general lack of competence of the officials of the Republican agency, as well as officials of certain protected areas, in protected areas management. None of the directors is professionally qualified in the field of the reserve's activities. All the experts are concentrated in the research centre, but they do not affect management decisions taken by the authorities.

2.5 Non-governmental nature conservation organizations

In Armenia, more than 19 NGOs deal with environmental protection issues (Appendix 2). Some are mainly interested in sustainability issues (such as "Sustainable Development", "Association on Sustainable Human Development"), others are concerned with alternative sources of energy ("ECOTEAM of Armenia", "Alliance of Armenian "Greens""). Social development in harmony with nature is the main focus of the "Social and Ecological Association". Development of ecotourism is the priority activity of the "Ecotourism Association". The issues of fauna protection are addressed by the "Fauna Protection Union" and "Fan Club Fauna", while flora-related issues are dealt with by the "Botanical Association of Armenia" and the "Union of Plants Protection (EDEM)". Research activities are conducted by the

"Ecological Foundation of Armenia". Organizations "BURAKN" and the "Charity Society of the Friends of Nature "AVISH"" are mainly engaged in ecological education. The task of coordination of nature conservation NGO activities is pursued by the "Centre of Environmental Problems".

3. Azerbaijan

3.1 Introduction

The Republic of Azerbaijan, the largest republic of the Caucasus, has an area of 86,600 km^2 and a population of 7.7 million. From north to south, its territory stretches from the Side and Main Caucasus ranges – including also north-eastern macro-slopes as far as the Samur river – to the mountains of the Lesser Caucasus and Talysh. To its north, Azerbaijan borders Georgia, and to the south, Iran and Turkey. More than 80% of the population are Azerbaijanis. Until the 1990s, the majority of the population (up to 30% in the Baku region) were Russians and Armenians. As a result of conflict in Sumgait and Nagorny Karabakh, practically all Armenians migrated from the Republic. Azerbaijan includes Nakhitchevan Autonomous Republic and, formally, Nagorny Karabakh - the object of military conflict which has continued for over a decade.

The high landscape and biological diversity of Azerbaijan results from the extreme diversity of relief, with altitudes from 28m below sea level (the Apsheron peninsula in the east of the Republic) to 4,480m (Bazar-Duzy, in the Side range); the complex geological and geomorphological structure; and the peculiarities of mountainous and marine climates. It is possible to distinguish five major regions which differ in their landscape structure and human influences upon landscape and biological diversity (Table 3.1). About 60% of the republic is occupied by the mountain systems of the Great Caucasus, Lesser Caucasus with Karabakhsky volcanic highlands, and Talysh. Between the ranges of Great Caucasus and Lesser Caucasus are the vast alluvial Kura-Araxinskaya lowlands. Azerbaijan's Caspian Sea coast and islands are not an integral natural unit and are separated into an independent region due to similar artificial conditions of landscape and biological diversity.

3.2 Landscape and biological diversity

3.2.1 Landscape diversity

Azerbaijan's landscapes are unique. They are characterized by sharp shifts from warm lowlands or semi-moist sub-tropics to highland permafrost. Vast areas are covered by dry sub-tropical semi-deserts on sierozems developed on the plains of the Kura-Araxinskaya lowlands. Near the edges of the lowlands, semi-deserts are replaced by dry plains on chestnut-brown soils. The plain landscapes also include mountainous plains with meadow-forest vegetation (Alazan-Agrichayskaya plains in the north-west of the Republic).

Table 3.1 Azerbaijan's

Region	Area (%)	Population (%)	Zones	Dominant land use	Typical landscapes
Greater Caucasus	30	20	foothill (<500m)	vegetable cultivation on irrigated land	semi-desert and semi-plain with fragments of sparse arid forest on alluvial meadow forest soils
			low mountains (500-1,200m)	horticulture	mountain forest and forest-plain on brown mountain-forest and nut brown mountain soils
			middle mountain (l,200-2,200m)	animal husbandry	mountain forest on brown mountain soils
			high mountains (>2,200m)	animal husbandry	mountain meadows on mountain-meadow soils, nival-glacial
Lesser Caucasus	22	12	foothill (< 500m)	viniculture	semi-desert on brown nut soils
			low mountains (500-1,200m)	horticulture	mountain forest plains on brown nut soils
			middle Mountain (1,200-2,000m)	animal husbandry	mountain forest on brown mountain soils and brown nut mountain soils
			high mountains (>2,000m)	animal husbandry	mountain meadows on mountain meadow soils, rarely nival
Talysh Mountains	6	8	pre-mountain plains (< 600m)	cultivation of tea, citrus	moist sub-tropical forests on yellow soils
			low mountains (600-1000 m)	animal husbandry	mountain forests of Girkan type on brown mountain soils
			middle mountain (l,000-2,500m)	animal husbandry	mountain plains on brown mountain forest soils and brown nut mountain soils
Kura-Araxinskaya Lowlands	37	10	lowlands, partially pre-mountain (< 200-400m)	cotton, winter pastures	semi-desert on gray soils
Caspian Sea Coast and islands	5	50	coastal-marine	oil extraction, recreation	semi-desert on gray soils, frequently with solontsy and wetland vegetation

landscape and biological diversity

Most valuable landscapes	**Typical flora**	**Most valuable flora**	**Typical fauna**	**Most valuable fauna**
marsh forest	juniper, Christ's thorn, *Ephedra*	bearded aspen, Kokh pine	pheasant	
oak forests on carbonate soils	oak, white beech	persimmon, berry yew, hazel nut	boar, roe deer	dapple and red deer
beech forests	beech, maple		bear, lynx	*Rupicapra rupicapra*, Dagestan mountain goal
subalpine high herbs, glacial	matgrass, reed grass, meadow grass	Caucasus rhododendron		
dwarf shrubs	pistachio, juniper	Eldar pine	Persian Gerbillina	
oak-beech forests	Georgian oak, eastern beech, Caucasus white beech	plane, Trautfetter maple	forest dormouse, marten	
beech forests; meadow-forest on laccoliths				
subalpine on volcanic plateaux	meadow grass, brome grass		kakelik	Bezoarovy goat, black grouse
relic sub-tropical forests	Caucasus beech, chestnut oak, eastern beech	iron tree	bear, lynx, wild cat, boar	porcupine
Girkan forests		*Albizia*, box tree		
Nagomo-xerophyte	pistachio, juniper	wild fruit	field mouse	
Tugai forests	sarsazan, *Salsola*, soleros, reed		soar, field mouse, mountain goat	Djeiran, *Pterocletes orientalis, Otis tetrax, Otidida*
wetlands (important for bird communities)	saltworts, rush	Caspian lotus	duck, heron	*Saiga tatarica*, seal, flamingo, *Otis tetrax*, sturgeon

The most diverse landscapes are those of foothills and low mountains (from 100-300 to 1,000-1,200 m). Depending on the moisture conditions, there are semi-deserts on grey soils (to the northeast and southwest of the Kura-Araxinskaya lowlands, and the highlands of Nakhitchevan Autonomous Republic), xerophytic, phryganoid (dry shrub), and arid, sparsely-forested landscapes on chestnut-brown and brown soils. A specific landscape type is of Tertiary broadleaf forests on yellow mountain forest soils.

There are three separate regions in the central mountains (1,000-2,000 m): Great Caucasus, Lesser Caucasus, and Talysh mountains. The central mountains of the Great and Lesser Caucasus are dominated by landscapes of beech and white beech forests on brown mountain soils. In deforested areas in northern Azerbaijan and Nagorny Karabakh, plains landscapes with meadows, shrubs, and phryganoid vegetation have formed on mountain-forest and brown meadow soils and on brown mountain-forest soils.

Azerbaijan's high mountains have two large areas of mountain meadow, subalpine, alpine, and sub-nival landscapes, on the mountain ranges of the Great Caucasus (>2,200 m) and Lesser Caucasus (>2,000 m). Due to the aridity of the climate, glacial landscapes are not widespread and are restricted to the high peaks of the Great Caucasus (Bazar-Duzi, Tfan, Shahdag).

3.2.2 Floristic diversity

The floristic diversity depends directly on the specific natural conditions, altitude, and regional peculiarities of the historic formation of the flora. Consequently, the Talysh mountains are a special region distinguished by their unique relic flora, with broadleaf forests including *Albizia jilibrissin, Parrotia persika,* and *Zelkova.*

Azerbaijan's vegetation includes 4,100 plant species, of which 9% are endemic. Vast areas of the Kura-Araxinskaya lowlands, Kobustan (eastern Azerbaijan), Apsheron peninsular, plains and foothills of Nakhitchevan Republic are covered by wormwood-ephemeral and wormwood-halophytic semi-desert vegetation. Salinized soils are covered by bushes and shrubs: heather *Salsola arbuscula, Holocnemum strobelaceum, Kolidium, Salicornia,* mountain *Salsola,* kargan etc. Along valley lowlands are bushes of *Tamarix* and wild sorghum.

The high plains and foothills are covered by wormwood/beard grass and beard grass plains with *Paliuzus,* wild *Rosa,* and wild *Punica.* In the semi-desert and dry-plains lowlands in the west of the Republic are sparse forests consisting of relic *Pinus eldarica, Juniperus oblonga,* and pistachio. Lowland forests including poplar, aspen, and oak are widespread on the Samur-Divichinskaya lowlands, Karabakh plains and Alazan-Agritchay valley due to the increased availability of groundwater.

The slopes of Great and Lesser Caucasus up to 2,000 m are covered with broadleaf forests consisting of eastern and Iberian oak, beech and white beech, maple, and ash. At the upper timberline are rare *Castanea* and small-leafed species (Litvinov's birch, Caucasus mountain ash).

Subalpine meadows (2,000-2,400 m) have high herbs (e.g., *Bromus variegatus, Avena ventricosa, Festuca varia).* The vegetation of alpine meadows (above 2,400 m) includes *Carex, Primula, Campanula, Gentiana,* and *Saxifraga.* The alpine vegetation on the volcanic areas of the Lesser Caucasus is extremely diverse.

3.2.3 Fauna diversity

Over 12,000 species of animals are found in Azerbaijan, including 17 species of mammals, 25 of birds, and seven of reptiles listed in the Red Book of the former USSR. The vast semi-deserts and plains of the Kura-Araxinskaya lowlands are typically inhabited by antelope, hare, the central Asian rodent *Hemiechinus auritus,* and reptiles such as *Vipera lebetina, Vipera raddei,* and tortoises. The most typical birds include *Porphyrio poliocephalus* (in reed bushes) and *Francolinus francolinus.* Lowland forests are inhabited by boar, roe deer, jackal, and badger. In lakes and aquatic regions of the coastal marine zone are many species of birds, including duck, goose, swan, heron, pelican, and flamingo. In the forests of the Talysh mountains are porcupine and leopard. The mountain forests of the Great and Lesser Caucasus are inhabited by Caucasus deer, roe deer, boar, brown bear, lynx, and dormouse. In the highlands of the eastern part of Great Caucasus are Dagestan mountain goats. The bird community is very rich and diverse, including the protected Caucasus black grouse, mountain partridge, stone thrush etc.

3.2.4 Protected areas and their development

Azerbaijan has a well-developed network of protected natural areas covering about 5% of the Republic's area. Many of the 14 natural reserves (Table 3.2) consist of two or more sites located some distance apart. Parts of reserves coincide with the areas of reservations with the same name, of which there are 15 in Azerbaijan. The main challenge of managing protected natural areas is to protect nature in the existing reserves and sanctuaries. In practice, there is considerable use of the lands of the reserves and reservations for agricultural purposes, and much illegal hunting. The problem is aggravated by the fact that the protected natural areas have indistinct boundaries and are divided into separate sites, which further complicates control. As a result of the Karabakh conflict, the fate of the inter-state Karagelsky-Sevlichsky reserve located on the border between Armenia and Azerbaijan is uncertain. Although reserves and

Table 3.2 Azerbaijan's protected areas

	Location in the Republic and the region	Area (000 ha)	Year of establishment	Protected areas or habitats
Girkansky	South-east; Talysh Mountains	2.9	1936	Up to 900m, moist sub-tropical forests of iron tree and chestnut oak
Geigelsky	West; Lesser Caucasus	6.8	1926	l,100-3,065m, mountain broad-leaved forest, mountain meadows
"Eldar pine tree" affiliate	West; Great Caucasus	0.4	1910 (reservation, since 1961 -reserve)	200-600m, plains and sparse and forests of Eldar pine
Zakatalsky	West; Great Caucasus	23.8	1930	600-3,600m, broadleaf and coniferous/small-leafed deciduous mountain forests, mountain meadows
Ilisunsky	North-west; Great Caucasus	9.3	1987	700-2,000m, broadleaf mountain forests
Ismailinsky	North; Great Caucasus	5.6	1981	800-2,250m, broadleaf mountain forests, mountain meadows, post-forest
Ismailinsky sanctuary		34.2	1969	
Pirkulinsky	Central, Great Caucasus	1.5	1968	800-1,500m, broadleaf mountain forests
Basutchaisky	West; Lesser Caucasus	0.1	1974	600-800m, mountain valley with chestnut forests
Turianchaisky	North-west; Great Caucasus	12.6	1958	400-650m, semi-desert and sparse arid forest
Karaiazsky	West (Kura-Araxinskaya lowlands)	4.6	1923 (reservation, since 197X reserve)	Marsh with tugai forests
Shirvansky	South-east (Kura-Araxinskaya lowlands)	25.8	1969	Semi-desert plains
Kyzyl-Agachsky		88.4	1929	Semi-desert plains and coastal marine
Aggelsky	Centre (Kura-Araxinskaya lowlands)	4.4	1978	Semi-desert plains and wetlands
Aggelsky reservation		9.2	1964	
Gobustansky	East	4.4	1966	< 1,000m, cultural-historic arid-denudation foothills
Karagelsky-Sevlichsky	Armenian/Azerbaijanian border	0.24	1987	2,600m, mountain meadows volcano and lake

reservations cover all the natural landscape zones, most reserves are primarily for the protection of a certain types of species: Kyzyl-Agachsky and Aggelsky - migratory birds; Zakatalsky - mountain fauna; Turianchaisky - arid flora; Girkansky - Tertiary flora etc. Of special interest is Gobustansky reserve, where ancient cultural landscapes with prehistoric rock paintings are protected.

3.3 Human influences on landscape and biological diversity

3.3.1 Land use structure

Agriculture is the dominant land use (Table 3.3). The agricultural land use pattern in the mountains reflects the traditions of the indigenous population, combining land cultivation and animal husbandry. The social and economic changes of the 1990s strengthened the natural component in agriculture, resulting in increased numbers of animals and frequent pasturing, haying and logging in the reserves and reservations.

The heavily inhabited coastal district is characterized by a large proportion of land occupied by industrial facilities, mines, oil and gas fields. This improper land use creates major problems in the organization of nature protection activities and environmental management.

Table 3.3 Land use structure in Azerbaijan (early 1990s)

Land use	**% of the Republic's area**
Agriculture:	50
- *ploughed fields*	*16.2*
- *perennial crops*	*5.3*
- *deposits*	*1.5*
- *hay fields*	*1.5*
- *grazing land*	*25.5*
Farm lands	1.3
Forest resources	12
Water resources	3.6
Other	33.1

3.3.2 Agriculture

There are 4.3 million ha of agricultural land, including 1.9 million ha of ploughed fields (1996). The intensification of agriculture is related to the broad use of construction to improve drainage conditions. In the 1980s, over 1.2 million ha were irrigated. However, construction of channels to improve conditions for agriculture has led to the emergence of swamps with sedge and reed vegetation, particularly on the Apsheron peninsular. The construction of new water storage basins and channels has resulted in microclimatic change and eroded irrigated areas. Today, over 40% of the irrigated land is salinized to some extent, requiring radical improvement.

The most important agricultural crops in terms of area are: wheat (500,000 ha), barley (100,000 ha), corn (10,000 ha). Cotton covers 90% of the area of technical crops and is concentrated in the Kura-Araxinskaya lowlands and western regions of the Republic. Tobacco is produced in the foothills and mountain regions, and olives and saffron on the Apsheron peninsular.

Much of the Kura-Araksinskaya lowlands are covered by winter pasturelands. Unregulated grazing has resulted in wind-induced erosion of semi-desert landscapes. Overall, 25% of the Kura-Araksinskaya lowlands show clear evidence of erosion processes.

From 1991 to 1996, livestock numbers on collective farms decreased somewhat (1,826,000 to 1,780,000 cows; 5,292,000 to 4,922,000 sheep and goats). Over the same period, the number of private livestock increased by 1.5-2 times. This particularly negatively affected the ecological condition of pastures near villages, contributing to the erosion and degradation of the vegetation cover of the lowlands and central lands.

3.3.3 Forestry

Forests currently cover 12% of Azerbaijan's area; 80% are in the mountains. The main forested areas are in the central mountains and on the southern macroslope of the Greater Caucasus, the northern macroslope of the Lesser Caucasus, and the Talysh mountains. In the lowlands, logging frequently takes place to meet the needs of local people for fuel and construction. As a result of economic activities, forests have remained in the form of separate blocks. In the highlands, logging is conducted in summer, when the population moves up to the summer pastures. In these areas, the upper timberline has been lowered by 100 m – and, in some places, 200 m.

3.3.4 Recreation and tourism

The landscapes of the coastal zone are very rich in recreational resources and characterized by many sunny days and an almost year-round bathing season.

However, the underdeveloped infrastructure and the region's location near the area of hostilities impedes mass tourism development. The coast's attractiveness for tourists is also lowered by the proximity of oil and gas fields.

In the past, recreational activities took place in the mountains, at resorts and rest houses with mineral springs in the Nakhitchevan Autonomous Republic and Nagorny Karabakh. Most of these resorts are currently closed; the remainder are only occasionally in operation.

3.3.5 Hunting and fishing

According to official data, Azerbaijan's catch of fish in the Caspian Sea declined from 39,700 to 6,900 tons from 1991 to 1996. However, according to independent expert evaluations, the illegal catch of fish increased, especially of valuable commercial species, such as sturgeon and salmon. After the withdrawal of Russian border patrol forces from the Azerbaijan coast, illegal fishing at sea has become practically institutionalized. Conditions for fishing control in the Kura and Arax rivers during sturgeon spawning have also worsened.

Hunting in the mountains has always been strictly regulated and has not been conducted commercially. Hunting of many species of animals has been subject to strict licensing. Today, these rules formally remain in force. However, illegal hunting is currently less subject to control, due to the increase in the number of firearms available to local residents and the lack of an administrative and legal framework to suppress illegal hunting. Recently, tourist services related to the hunting of certain species of animals have begun to emerge. In particular, the ecological media has witnessed cases of bikers' illegal hunting of djeiran in semi-desert landscapes.

3.3.6 Industry and transport

Azerbaijan's industries generally utilise high amounts of energy. In recent years, there has been a major shift to raw material extraction, accompanied by a general fall in industrial production. A large energy sector has been developed on the Apsheron peninsula. The bulk of energy is produced at power heating plants operating on gas and diesel oil. There are also large hydroelectric power stations on mountain rivers, including the Kubinskaya, Shekinskaya, and Zakatalskaya. In the 1990s, Azerbaijan produced 14.6 billion kW of energy per hour. Petrochemical enterprises use locally produced oil, and are also located in the coastal zone. The high concentration of power and heating plants and petrochemical enterprises in this zone creates unfavourable ecological conditions for the population and wildlife.

There has been a significant decrease in light industry. For instance, many of the 12 large cotton processing plants operating in the 1980s in cotton

harvesting areas are no longer operational. The main branch of food industry is wine production, which takes place in the foothills and low mountains.

There are 2,100 km of railways, and 25,000 km of roads. The transport network with the highest density is in the Apsheronsky raion which is of recreational significance. The mountain areas only have road access. In recent years, the planning of the construction of a gas pipeline through Azerbaijan into Georgia has been the subject of extensive debate.

3.3.7 Mineral resources mining

The Republic is the oldest region of oil and gas extraction. Oil extraction and related industries have been concentrated in Baku since the beginning of the 20th century. The oil is of high quality, practically free of harmful sediments. Up to 65% of these valuable resources are extracted at sea. About 30 varieties of oil are concentrated on the Apsheron peninsula. The current volume of oil extraction (including gas condensate) is 9.1 million tons (11.7 in 1991), and of gas, 6.3 billion m^3 (8.5 in 1991). Over 70% of the enormous industrial infrastructure is obsolete and does not meet ecological requirements. In the mountains, there are well-developed copper mines (Belokanskoye and Kedabekskoye), as well as lead and zinc mines (Gumushlugskoye etc.).

3.3.8 Military activities

Military activities still persist within the zone of the Karabakh conflict and in border areas. Hundreds of people have been killed, wounded, or become refugees. With huge economic losses and destruction of the entire economy, the environmental impact is quite evident. Today their direct ecological implications include:

- destruction of blocks of forest in the zone of conflict as a result of fires and logging operations, affecting many hundred thousand hectares;
- migration of large mammals, particularly from the phryganoid landscapes of the central mountains;
- erosion hotspots in the mountains as a result of the use of military vehicles, explosions, and the construction of military engineering facilities.

Indirect implications include the disturbance of the traditional land uses and the abandonment of agricultural lands in Nagorny Karabakh, resulting in the renaturalization of fields and vineyards, the destruction of water supply and irrigation systems, and the degradation of cultural and historic landscapes in general.

3.3.9 Air and water pollution

Although industrial production has decreased significantly, air and water pollution has declined less rapidly, due to the obsolescence of industrial equipment, water, and heat supply systems. Emissions of harmful substances from permanent sources decreased from 1,919,000 tons in 1991 to 370,000 tons in 1997. Emissions in 1996 included: sulphurous anhydride, 40,000 tons; nitrogen oxide, 24,000 tons; carbon monoxide, 19,000 tons. The discharge of polluted waste water into surface water amounted to 247 million m^3, with a total intake of 13,462 million m^3 (plus 0.3-0.5 billion m^3 of sea water).

3.4 Environmental policy and institutions

3.4.1 State planning

The decreased role of the State in different branches of the economy has affected the ecological condition of landscapes and biota in various ways. In agriculture, there is a marked emphasis on extensification. In contrast to other regions of the CIS, the proportion of ploughed fields has increased: from 1,577,000 ha in 1991 to 1,885,000 ha in 1996. The amount of mineral fertilizers used has drastically decreased. As a result of the ageing of the equipment of irrigation systems, and their gradual decline, many small irrigated fields have become local erosion hotspots.

Today, both the forestry services, whose main function was to protect blocks of forest, and nature conservation agencies find themselves in an obvious crisis situation. The lack of financing and reduction of legal liability for ecological violations has led to drastic degradation of the Republic's mountain forest landscapes.

The modern State targeted programs for nature conservation are largely financed from foreign sources. The main priorities include the Caspian Sea and its coast and, to a lesser extent, mountain ecosystems.

3.4.2 State and administrative control

The State and administrative control of ecology and nature protection involve both specialized ministries (natural resources, ecology, forestry) and committees at the level of the Republic and agencies at lower territorial levels: in Nakhitchevan Autonomous Republic, 65 raions, 69 cities (including 11 cities under Republican authority), 13 municipal areas, 132 towns, and 1,314 rural administrations. The main levels of the State and administrative control are the Republic (Republican ministries and agencies), raion (urban and rural), and rural administrations.

In 1996, targeted State financing from the State budget amounted to 8.4 billion manats for air protection (mainly in the Baku region); 1.7 billion manats for the protection and sound use of water resources (water supply and purification systems repairs); and 8.8 billion manats for the protection and sound use of lands. In the latter case, one of the main responsible agencies is the land resources agency of the Republic, which had been established and developed in the USSR, as well as relevant urban and rural land committees.

In recent years, local communities (there are 4,242 rural settlements) have played an ever increasing role in regulating the use of natural resources at the local level. Based on historical experience and traditions of nature use, these communities seek to compensate for the shortcomings in the State legal system of nature use control and management (e.g., organization of public cattle grazing, participation in land distribution). Joint-stock agricultural enterprises organized on former collective farms and soviet farms continue to play an active role at this level. Farms occupy 132,800 ha (only 3.1% of the total area of agricultural land).

3.4.3 Non-governmental organizations

The development of non-governmental organizations (NGOs) (Appendix 2) has largely been facilitated by foreign organizations and funds that finance informational and institutional activities. The fruitful work and successes of ISAR in the Caucasus region (since 1994) in developing new NGOs and civil society have served as a precondition for the establishment of the non-governmental sector in the region as well as nature conservation groups. The main shortcoming of the existing structures lies in their concentration in the Baku region and insufficient coverage of local areas – especially rural areas – by public activities.

3.4.4. Cooperation, projects

With the support of the Wallace Genetic Foundation, a telecommunication project has been implemented through the Sacred Earth network, related to the establishment of a network of Caucasus nature conservation NGOs - CENN. CENN is an open, non-hierarchic structure aimed at supporting communications on the issues of environment protection. An electronic bulletin entitled "The Caucasus Nature Conservation News" is produced within the framework of this project.

The TEAP program (environmental awareness raising) has been elaborated to address the following issues: improvement of the status of nature conservation issues in 13 TACIS countries; development of an integrated ecological mentality; improvement of the status of non-governmental organizations;

participation in public and State debate. Contact information is included in the electronic bulletin entitled "The Caucasus Nature Conservation News".

Unfortunately, the favourable conditions created for informational activities by foreign foundations do not lead to comprehensive ecological control of the use of nature and fundamental scientific research. However, the traditional academic schools in the university and the Academy of Science continue fundamental research, initiated in the pre-reform period, of the modern factors of the dynamics of the natural environment, mainly with finances from the State budget.

4. Georgia

4.1 Introduction

The Republic of Georgia is on the southern slopes, and to the south, of the Caucasus mountains, which serve as a natural border with the Russian Federation. The country stretches along the Caucasus, bordered by the Caucasus range to the north, the Black Sea to the west, Turkey and Armenia to the south, and Azerbaijan to the east. Its area is 69,700 sq. km, and its population in 1996 was estimated as 5,373,000 (55.2% urban, 44.8% rural), growing at about 1% a year. The average population density is 78 people per sq. km. The ethnic composition of the population shows a most complex and rich picture. Data from the 1989 census show that ethnic Georgians comprised 70% of the population, with a number of significant minorities including Armenians (8%), Russians (6%), and Azeris (6%). Thus, the majority language is Georgian; principal minority languages are Abkhazian, Armenian, Azeri, Ossetian, and Russian. The majority religion is Eastern (Greek) Orthodox; other principal confessional groups include Muslims, Armenian Gregorians, Jews, Catholics, Baptists, and Yezids. The various conflicts in the region have caused large movements of people: about 250,000 internally displaced persons and refugees. Most ethnic Georgians were distributed throughout Georgia, while the Abkhaz generally move to Russia, and Ossetians mostly to North Ossetia.

The main cities are the capital of Tbilisi (1,360,000), and other urban centres including Kutaisi (239,000), Rustavi (156,000), Batumi (138,000), Gori (69,000), Poti (50,000) and Zugdidi (51,000). The Republic is divided into 12 large administrative regions (Mkhare), which are further subdivided into 63 districts. There are also eight zones under the control of municipal councils.

4.1.1 Historical-ethnographic provinces of the mountain regions

Eight mountain regions can be recognised in the Great Caucasus of Georgia. These are described below from west to east.

The Abkhasian mountains (part of the Autonomous Republic of Abkhasia; administrative centre Sokhumi, 0 m). Since 1989, the population in these mountains (west Caucasus, 600-2,700 m) has decreased dramatically, due to the conflict in Abkhasia, from 30,000 to approximately 10,000 (or even less). Most are ethnic Abkhasians, Georgians, Russians. Current information is limited.

The Svaneti region (administrative centre, Mestia, 1,700 m) is one of the largest and "strongest" mountain communities in the Caucasus, on the south

slopes of the Central Caucasus mountains. There are up to 20,000 permanent inhabitants. Ethnic Georgians (Svanetians) comprise more than 90% of the population. Economic activities include cattle breeding and small private agricultural enterprises (potatoes, cereals). The main products are milk, cheese, meat, and milk products. The region has enormous tourism potential, particularly because of its cultural heritage and alpine landscapes (Svaneti is a UNESCO World Heritage site), and potential for mountaineering and trekking (six peaks around 5,000 m), community tours and ethnographic trails. Communication is limited to the road from the town of Zugdidi (20 km from the sea) to Mestia (180 km).

Racha province (administrative centre, Oni, 1,560 m) has a small permanent population (most of the older generation), mainly living in small villages between 900 and 2,100 m. The total population is 7,000, of whom 90% are ethnic Georgians. The main economic activities are cattle breeding and the production of milk products and meat. The main problem is communication. Most of the roads are in very bad condition and are closed during the winter. Tourism destinations focus on health resorts (mineral springs), mountain wildlife trekking, mountaineering, and community-based tourism.

Inner Kartly (former south Ossetia: administrative center Tskhinvali, 670 m) is on the southern slopes of the central-east Caucasus. The population is up to 60,000, including 42,000 in Tskhinvali. The ethnic composition is Ossetian 48%, Georgian 42%, and Russian 8%. The main economic activities are small private agricultural enterprises, industry (only in Tskhinvali), and cattle breeding in the mountain villages. Since the 1989-1996 ethnic conflict between Ossetia and Georgia, the potential of tourism resources and health resorts has diminished and needs serious reinvestment. Political stabilisation during the last five years has created conditions for the development of new economic and social initiatives.

Khevi province (administrative centre, Kazbegi, 1,760 m) is on the northern slopes of the Great Caucasus range. The population is 8,000: 75% Georgian, 20% Ossetian. The province borders on the Republic of Northern Ossetia-Alania in the Russian federation and plays a strategically very important role between Russia and the Trans-Caucasian republics. The Georgian military highway, which crosses the province, is in many cases the only communication road for Armenians and Georgians. Transportation creates opportunities for local economic initiatives (small and micro transport enterprises, food and travel service provision). Traditional economic activities are cattle and sheep breeding, and milk and meat production. The region has great potential for mountain tourism development focused on alpine ski resorts ("Gudauri" ski-resort, a Georgian-Austrian joint venture, has successfully operated since 1988), community-based adventure tourism, mountaineering and trekking.

Mtiuleti province (administrative centre, Dusheti, 900 m) is on the south slopes of the central-east Caucasus, and is one of the largest administrative units in terms of area. The total population is 65,000, of whom 50,000 live in Dusheti. The ethnic composition is Georgian 70%, Ossetian 15%, and Armenian 5%. Economic activities include agriculture (fruits and vines in the Aragvi valley) and, in the mountain villages, cattle and sheep breeding. The region is strategically important for communication between north and Trans-Caucasian republics. The environment of both Mtiuleti and Khevi provinces has been severely damaged by industrial activities related with transport infrastructure development (soil erosion, artificially changed landscapes, landslides, etc.).

Khevsureti province (administrative centre, Barisakho, 1,100 m) is administratively part of Dusheti region. This is one of the most isolated and well preserved mountain provinces, on both the south and north slopes of the east Caucasus range. The population numbers 4,000, in small villages and mountain farms. The economy is based on cattle and sheep breeding, and milk and meat production. There are no medium and large industrial units. The province is extremely attractive for mountain tourism focused on ethnography, wildlife, and trekking.

Tusheti province (administrative centre, Omalo, 1,780 m) is on the north slopes of the east Caucasus. The province has a population of 2,500 - ethnic Georgians, Tushetian population - most of whom migrate during the winter season to the Alazani plain, returning in the summer to the 18 mountain villages. Only a few (40-50) people live in and protect the villages all year. Economic activities include cattle and sheep breeding, and cheese and meat production. The region has extraordinary potential for adventure tourism development (eco-tourism, trekking, wildlife and ethnography tours). During the five-six winter months, Tusheti is isolated from the rest of the world; only emergency transportation by helicopter is available.

4.1.2 Climate

The mountains form a barrier against cold northerly winds, allowing warm air from the sea to influence the climate. The climatic zones range from moderately humid Mediterranean to dry-continental Arab-Caspian and the cooler Alpine-like montane. A humid sub-tropical climate characterises the Western Georgian coastal lowlands, while Eastern and Southern Georgia have a drier climate.

The average temperature in January, the coldest month, varies from +3 to -2°C, while in August the average temperature is 23 to 26°C. The average annual temperature in Tbilisi is +12°C; the July average is +24°C, January +7°C. Mean annual precipitation varies from 2800 mm in West Georgia to only 300 mm in East Georgia.

4.2 Landscape and biological diversity

4.2.1 Landscape diversity

More than 80% of the area of Georgia is high and middle mountains. Three peaks are over 5,000 m (highest peak, Skhara, 5,150 m), and ten are higher than 4,000 m. The northern part of the country is dominated by the high mountains of the Great Caucasus range, while the central and southern parts are also mountainous, but lower, rising to 3,000 m (Likhi range and Javakheti volcanic platon), and covered by alpine fields and forests. In Eastern Georgia, all the rivers are tributaries of the Mtkvari (Kura), flowing into the Caspian Sea. The West Georgian rivers, of which Rioni and Enguri are the largest, run into the Black Sea basin. Between the Great and Lesser Caucasus lie the warm, humid lowland of the Kolkheti Plain in western Georgia, and the dry Iori Plateau and Alazani Valley in the east.

Georgia encompasses various landscapes and climatic zones: from the wet subtropics of the West Georgian lowland and dry semi-deserts in the south-east, to the alpine and nival landscapes of the main Caucasus mountain regions. More than 40% of Georgia is forested. Western Georgia is characterised by four ecological zones: subalpine from sea level up to 1,900 m; alpine from 1,900 to 2,500 m; sub-nival from 2,500 to 3,100 m; and nival from 3,100 to 5,150 m. Eastern Georgia is characterised by six zones: semi-desert (150-600 m); forest (600-1,900 m); subalpine (1,900-2,500 m); alpine (2,500-3,000 m); sub-nival (3,000-3,500 m); nival (3,500-5,000 m).

The landscapes are mainly characterised by the Caucasus range in the north, the central plains (Kolkheti lowlands in west Georgia, and the river Mtkvari and Alazani plains in central-east Georgia), the Meskheti-Djavakheti mountain ranges in the southwest, and the volcanic platon in the south.

4.2.2 Floristic diversity

Despite its relatively small area, Georgia possesses an unusually diverse flora, from subtropical to alpine-nival. This is a result of a variety of geographical and climatological zones, a topography of marked contrasts, and a variety of landscape features. Georgia has 5,000 vascular plant species and approximately 8,300 species of cryptogamous vegetation (73 species of fern, 600 of moss, 5,000 of fungi, 2,000 of seaweed). A total of 380 species are endemic to Georgia. Some of the most fascinating plant species date back to the Tertiary era more than 60 million years ago, and occur at altitudes of about 1,000 m, especially in the Kolkheti region.

4.2.3 Fauna diversity

The fauna combines European, central Asian, and north African elements and includes 100 species of mammals, over 330 of birds, 48 of reptiles, 11 of amphibians and 160 of fish. There are 152 species of plants, 21 of mammals, 33 of birds and 10 of reptiles and amphibians listed as rare, threatened, or endangered in the Georgian Red Data Book.

The lowlands of western Georgia support an extremely diverse fauna. Mammals include hedgehog, mole, shrew, horseshoe bat, and Caucasian squirrel.

The mountains provide habitat for badger, weasel, stone marten, wild cat, bear, wild boar, roe deer, wolf, jackal, fox and lynx. Endangered species in the Caucasus include Caucasian Leopard (*Panthera pardus Ciscaucasia*), Lynx *{Lynx lynx)*, striped hyena (*Hyaena hyaena*), wild goat or Tur (*Capra aegagrus*), goitered gazelle (*Gazella subgutturosa*), and Caucasian red deer (*Cervus elaphus maral*).

The birds include pheasant, quail, large curlew, woodcock, pochard, and cormorant. Additional birds present during migration include pelicans, storks, bitterns, falcons, hawks, hen harriers, eagle owls, cuckoos, hoopoes, kingfishers, woodpeckers, mallards, starlings, orioles and swallows. Endangered species include white-tailed eagle, golden eagle, bearded vulture, black stork, great white egret, and white egret.

The fish species include trout, Black Sea salmon, Atlantic sturgeon, dike, sea roach, vobla, Caucasian chub, Kolchian barbell, and sazan. The fauna of the coastal zone also include three species of dolphins - common dolphin, bottle nosed dolphin, porpoise - as well as the following fish species: shark, ray, beluga, Russian and Atlantic sturgeon, Black Sea salmon, herring, dogfish, flounder and swordfish.

4.2.4 Protected areas

Georgia's varied landscapes, with coastal wetlands, volcanic plateaux and ridges, rugged forest-clad mountains and arid semi-deserts, are part of the World Wide Fund for Nature (WWF) Global 200 Key Ecoregions. Protected areas cover 2.4% of the national area (1,680 sq. km: Table 4.1). They protect a significant proportion of the country's species of flora and fauna (Table 4.2).

In an effort to develop a comprehensive protected area system that will cover important areas for biodiversity conservation, the government - together with Georgian scientific institutions and with support from the WWF - has been working out a plan to investigate and establish a network of protected areas designated as national parks.

Table 4.1 Existing (ex-Soviet) protected areas in Georgia (1996)

National parks and protected areas	Date of establish-ment	Area (ha)	Forested area (ha)	Alpine area (ha)	Water resources: lakes, dams, rivers (ha)
Algeti	1965	6.822	5,835	286	
Akhmeta	1935	16,297	13,707	1,801	146
Adjameti	1957	4,845	4,707	45	
Bitcchvinta	1966	….	…….	0	
Bordjomi	1956	17,948	1,650	692	0
Vashlovani	1935	8,034	5.847	2,187	
Kintrishi	1959	13,893	12,817	200	2
Kolkheti	1935	500	340	3	157
Lagodekhi	1912	17,932	12,167	4,999	88
Liakhvi	1977	6,388	5,386	659	24
Mariamjvari	1939	1.040	924	12	
Saguramo	1946	5,359	4,979	193	
Sataplia	1959	354	354	0	
Ritsa	1957	16,289	….	….	….
Psou-gumista	1979	40,819	….	….	….
Kazbegi	1976	8.707	3,957	97	0
Tbilisi	1973	19,964	18,362	120	61
Total		**188,836**	**161,848**	**12,092**	**675**

Table 4.2 Numbers of protected fauna species in Georgia's national parks and protected areas

National parks and protected areas	Total number of species	Number of indigenous species	Mammal species	Bird species	Fish species
Algeti	1,000	9	17	43	
Akhmeta	1,500	26	38	60	7
Adjameti	645	8	X	10	4
Bitchvinta	…	…….	……..	0	
Bordjomi	743	22	21	44	1
Vashlovani	670	39	39	63	-
Kmtrishi	1.044	24	22	35	6
Kolkheti	350	12	10	29	-
Lagodekhi	1,317	37	39	138	4
Liakhvi	….	….	….		
Mariamjvari	670	6		20	-
Saguramo	660	95	20	45	-
Sataplia	661	12	15	9	-
Ritsa	….	….	….	….	-
Psou-gumista	….	….	….	….	-
Kazbegi	140	30	18	45	-
Tbilisi	67	18	22	30	2

The proposed national parks will cover 6-7,000 sq. km (8-10% of the national area), and a further 21,000 sq. km will be protected. Supported groups will consist of representatives of local communities, authorities, conservation and protected area staff, and educators. The Georgian parliament has passed legislation setting up the framework for new protected areas, the demarcation of their boundaries and enforcement of management guidelines. Mr. Eduard Shevardnadze, the President of Georgia, joined WWF's Living Planet Campaign and pledged that, by the year 2000, over the 20% of the country would be protected as Georgia's "Gift to the Earth".

The Government is giving highest priority to the protection of the ecologically important and highly sensitive Kolkheti lowland, which is covered by sub-tropical deciduous forests and wetland, and to the adjacent endangered Atlantic sturgeon (*Acipenser strio*) and other fish. With the assistance of the World Bank and Global Environmental Facility (GEF), WWF has drawn up management guidelines for the proposed Kolkheti National Park and is now trying to raise funds to implement this plan

As the Great Caucasus straddles the border between Georgia and Russia, cross-border cooperation will be vital in tackling long-term conservation issues. In June 1996, WWF organised a workshop in which Georgian, Russian, and Dagestan officials discussed local conservation problems. Participants particularly agreed to cooperate on the establishment of a cross-border protected area that would incorporate the Lagodekhi Nature Reserve in Georgia, and the Gutonski Nature Reserve on the Russian side.

4.3 Human influences on landscape and biological diversity

4.3.1 Agriculture

Almost half of Georgia's land is in agricultural use; most of the remainder is forest. Only a quarter of the agricultural land is arable land (800,000 ha in 1992): no more than about one seventh of a hectare per person, which sets severe constraints on food self-sufficiency. Another tenth has been used in recent years for perennial crops, mainly tea, citrus, and grapes.

Citrus fruit production is heavily concentrated along the Black Sea coasts (Abkhazia, Adjara, Guria, Samegrelo). Wine is mainly produced in Kakheti (east Georgia), and to a lesser extent in other regions. The centre for fruit growing is in Shida Kartly (central Georgia). The focus of potato and vegetable production is Kvemo Kartly and Samtskhe-Javakheti (south and southwest Georgia).

Starting in 1991, the Georgian parliament has reformed land ownership. Former soviet forms of state land ownership have gradually been changed to forms of private (physical and judicial) ownership. Most agricultural land

now belongs to private owners or local residents for long-term rent. By October 1996, 4 million Georgian citizens privatised and became owners of 752,700 ha: 10.8% of the national area and 23.9% of all agricultural land. In total, 628,000 village inhabitants received 1.03 ha each, and 325,000 families each received 0.21 ha. Following the rental agreement, 295,100 ha were given to physical enterprises (35,000 persons received 3.4 ha each) and agricultural enterprises (974 small- and medium-size enterprises received 181 ha). According to 1997 figures, more than 1,007,700 ha are in private ownership or rented long term; 33.7% of all agricultural land, 52.7% of pastures. The changes in land ownership are the results of the general strategy of the Republic of Georgia toward the democratization of society and free market economy.

4.3.2 Forestry

Georgia is rich in forest resources. There are 2,988,400 ha of State forests, of which 2,752,300 ha are forested - 39.6% of the country (Table 4.3). The total estimated timber stock is 434 million m^3 (as of January 1996). During the economic transition period and because of social-economic difficulties, the forest resources were used in a non-sustainable and non-regulated way. Between 1991 and 1996, 213,378 m^3 timber were cut (Table 4.4).

Table 4.3 Forest resources of Georgia

	Area (ha)	**Area defined as forest (ha)**	**Area covered by forest (ha)**
Georgia – total	6,950,000	2,988,400	2,752,300
Adjara	300,000	188,800	182,100
Abkhazia	860,000	508,800	476,800

Table 4.4 Total area of forests and timber resources in Georgia, 1985-1997

	Forested area (million ha)	**Forests (% of national area)**	**total timber resources (million m^3)**
1985	2.77	39.7	419.0
1990	2.75	39.6	421.0
1995	2.75	39.6	434.0
1996	2.74	39.5	433.5

The existing system of forest regulation strictly forbids any industrial activities (forest cutting) without special permission from the Ministry of Environmental Protection. By the end of 1996, the officially permitted legal-industrial use of timber resources was 200,000 m^3 on 27,168 ha.

4.3.3 Recreation and tourism

International tourism is a priority area for hard currency income to Georgia. Traditionally, Georgia was a primary tourism destination for the East European and former Soviet market. In 1989, Georgia hosted more than 1,700,000 visitors, including 170,000 foreigners. Due to political and economic changes, this mass 'domestic' market no longer exists. Georgian tourism needs reorientation to the new market, especially western countries. It has several important tourism attractions, such as its geographical location between Europe and Asia; easy access from Europe (two-three hour flights to central Europe); a rich cultural-historical heritage; high landscape diversity, from beaches and wet subtropics to glaciers and 5,000 m. peaks; a relatively cheap domestic market; existing communication and bank services; national parks; and traditionally hospitable people.

The priority forms for the development of the tourism industry are small-scale and community-based mountain adventure tourism (eco-tourism, mountaineering, trekking, mount-biking) and special tourism (such as travel/study programmes, research expeditions, discovery tours, alpine skiing and heliskiing). The most interesting tourism destination areas are the Svaneti mountain communities, the Tusheti valley, Khevi province, the south Caucasus and volcanic plateaus, the Kakheti and Alazani plains, and the west Georgian mountains (Adjara).

The institutional capacity of tourism needs to be developed in several directions: establishment of a national agency for sustainable tourism development (with support from the European Commission), training and education programmes, tourism information network and information services, and marketing and promotion of "green tourism" products.

4.3.4 Hunting and fishing

The Ministry of Environmental Resources and the State Department of Protected Areas regulate hunting. Hunting reservations cover 4,000,000 ha (at the end of 1996). The budget for the recovery of species of wild animals by the State Forest Department has varied considerably: $384,000 (1990); $430,000 (1991); $2,700 (1992); $2,000 (1993); $541 (1994); $621 (1995); $35,000 (1996). Populations of game animals at the end of 1996 were: 408 red deer; 6,964 roe deer; 2,597 boar; 1,778 bear; 19,472 fox; 3,431 wolf; 2,500 wild duck; 29,202 rabbit; 11,702 lynx.

The upper streams of mountain rivers in the Caucasus are rich with trout and salmon. There are no regulations concerning river fishing. Traditional forms of mountain river net fishing can be successfully incorporated into mountain adventure programs.

4.3.5 Mineral resources and energy

Georgia has one of the richest deposits of manganese in the world, an important raw material for the development of ferrous metallurgy. Total reserves are estimated as about 200 million tonnes. The proportion of high-quality ores, for which the mines were highly reputed, has been declining, partly due to over-exploitation during the Soviet era. Georgia also possesses valuable deposits of non-ferrous metals and poly-metallic deposits of arsenic, copper ore, and some gold, silver as well as zeolites, bentonite clay, barite, and obsidian. There are large reserves of materials used in the construction industry, especially high-quality marble, decorative gravel, and clays suitable for cement.

The estimated underground water and mineral water resources amount to 17-18 km^3; 570 m^3/second. About two-thirds of this is located in west Georgia, at 10-15 m depth. About 2,000 mineral springs daily discharge over 130 million litres, most of which is wasted. The chemical composition varies; they include carbon dioxide, sulphide, methane, and nitrogen.

Through Georgia is not, at present, considered to be rich in either oil or gas, its potential for hydro-electricity is about 100-160,000 billion kWh; eleven times the total amount of electricity consumed (Table 4.5). Established coal reserves are about 350 million tonnes. Much of the coal is of relatively poor quality - in Tkibuli, Tkvartcheli (west Georgia) and Akhaltsikhe (south Georgia). The maximum output is 3 million tonnes. Known oil reserves in east Georgia are about 12 million tonnes, probable reserves 5,000 million tonnes; estimated natural gas reserves between 2 and 98 billion m^3. There are indications of oil in west Georgia (Black Sea shelf).

Geothermal water sources should be important energy resources, as there are estimated reserves of 200-250 million m^3/year, at 50-100°C, which can provide more than half a million people with heating. An analysis of the Lisi resources (near Tbilisi) demonstrates that production could increase from 1 million to 4 million m^3/year.

There is also considerable potential for the explotation of wind energy. The most suitable area is around Mta-Saboueti (Likhi range), which receives 4 m/s wind velocity for more than 7,000 hours annually.

4.3.6 Water resources

Georgia is extremely rich in water and mineral water resources, with 26,000 rivers and 850 lakes. There are 560 m^3 of underground water resources. Potential hydroelectric resources are more than 60 billion kw, only 15% of which is used (Table 4.6). Georgia has 2,300 mineral springs, with 130 million litres flow annually. The largest rivers belong to the Black and Caspian Sea basins (Table 4.7).

Table 4.5 Industrial use of energy resources in Georgia

	Total electricity production (million kw)	**Hydro-energy (million kw)**	**Thermal energy generation (million kw)**	**Oil (000 tonnes)**	**Gas (million m^3)**	**Coal (000 tonnes)**
1985	14.7	6.2	8.2	552	70	1,674
1990	14.2	7.6	6.6	186	60	956
19%	7.2	6.1	1.1	128	3	23

Table 4.6 The ten largest lakes and reservoirs in Georgia

	water surface (km^2)	**Volume (million m^3)**	**maximum depth (m)**
Enguri reservoir	13.5	1092	230
Jinvali reservoir	11.5	520	98
Sioni reservoir	12.0	325	67.5
Samgori reservoir	11.8	308	45.0
Faravani lake	37.5	91	3.3
Ritsa lake	1.49	94	101
Tabatskuri lake	14.2	221	40.0
Paliastomi lake	18.2	52	3.2
Jandara lake	12.5	52	7.2
Tkibuli reservoir	11.5	84	32.0

4.3.7 Water and air pollution

In 1994, the European Commission's (EC) Technical Assistance for the Commonwealth of Independent States (TACIS) programme evaluated the Georgian drainage and irrigation system rehabilitation action plan for 2010.

Table 4.7 Major rivers in Georgia

Name of river	length (km)	area of basin (km^2)	basin belongs to
Mtkvari (above Tbilisi)	474	21,100	Caspian Sea
Tchorokhi	438	22,100	Black Sea
Alazani	351	11,800	Caspian Sea
Rioni	327	13,400	Black Sea
Iori	320	4,650	Caspian Sea
Enguri	213	4,060	Black Sea
Kcia-khrami	201	8,340	Caspian Sea
Tskhenistkali	176	2,120	Black Sea
Khobi	150	1,340	Black Sea
Kvirila	140	3,630	Black Sea

The total requested investment for programme realization was 919,560,000 GEL. The investment programme was worked out by the World Bank which, in 1996, allocated 2,000,000 GEL for the reconstruction of Tesi-Okami and Tbilisi-Cumisi water channels and of the Poti hydrosystem and Terebeni irrigation systems. In 1996, a World Bank expert group together with "Tbiltskalkanali" (state department of water channels) worked out a plan of modernization for the Tbilisi water supply system. The project goals are reconstruction of existing systems, optimization of working process, minimization of water losses, development of control and monitoring system, and reconstruction of water treatment and filtration systems. The first step of project realization started in 1998; the required investment is US$ 25 million.

TACIS has initiated a number of activities:

- development of an international programme on transborder water communication systems. The first stage project included the basin of the Mtkvari river. The requested investment for the first stage was US$215,000, and US$750,000 for the institutional development of the monitoring network;
- the regional TEAP - TACIS Environmental awareness program;
- rehabilitation of the Tbilisi waste management system (from 1998);
- preparation of the National Environmental Action Plan (NEAP);
- establishment of the Regional Environmental Center (REC), in Tbilisi.

In 1994-1998, the EC TACIS and PHARE programmes and the Global Environment Facility (GEF) were involved in the Black Sea Environmental programme. One of the proposed programmes is the Rehabilitation of the Batumi delpinarium and Aquaculture Centre.

4.3.8 Environmental degradation

Deforestation, wetland drainage, soil, water and air pollution, dam-building, and poaching of wildlife negatively influence biodiversity. Some of the problems first arose during the Soviet era, when national industrial and agricultural production targets were pursued with blatant disregard for the environment. Huge hydropower dams destroyed the ecological balance of mountain gorges, altering the microclimate and endangering fish and local mountain communities. Some of the beaches of the Black Sea coast, once a wonderful recreation area, now lie deserted because Georgians are afraid to risk bathing in the polluted sea (oil pollution, heavy metal contamination, fertilisers washed down in the rivers).

According to the Georgian industry development plans and pollution treatment technology, the quantity of air pollutants between 1995 and 2000 was predicted to increase by 38%, to 220,000 tonnes.

4.4 State environmental policy and institutions

4.4.1 State environmental policy

The state environmental policy is set out in the strategic action plan for social-economic development. Given the economic and ecological situation, the optimal funding for environment protection actions should not be less then 1% of GNP. To respond to the dramatic situation regarding environmental degradation, the state environmental policy action plan includes several topics, dedicated to strengthening governmental control on environment preservation and sustainable use of nature resources.

In the period 1996-2000, the priorities are to increase control on:

- exploitation of natural resources according to state guidelines;
- rehabilitation and environmental protection actions to treat damaged soil, forests, air and water resources;
- transportation, import, export, re-export, conservation and production of industrial toxic or radioactive waste products;
- import/export of chemical and toxic minerals and chemical products, as permitted/regulated by the state;
- realisation of agreements and state permits to exploit natural resources (operation of private and state industrial companies).

The active role of regional and local state departments for environmental protection is crucial.

One of the important roles in this process belongs to the international programmes "Black Sea Environmental Programme" and "Sustainable

development of Black Sea Regions". The successful realisation of these actions will create conditions for the development of sustainable forms of natural resource management, sources of alternative energy, transportation, agriculture, tourism and industry development. The estimated investment fund is US$ one billion, over 15 years.

In June 1999, the President of Georgia, Mr. Eduard Shevardnadze, signed the law "About the social, economic and cultural development of the high-mountain regions of Georgia". This was developed by the mountain commission of the Georgian Academy of Sciences, taking into consideration the national constitution and international recommendations for national mountain policy and legislation. The law applies to all mountain districts above 1,500 m and, in particular complex cases, above 1,300 or even 800 m. Its implementation will affect the implementation of other laws, such as those relating to land property, education, public health, taxes, and employment. It clearly reflects the protectionist policy of the state in relation to mountain areas.

4.4.2 Government and parliamentary commissions

Environmental protection and natural resource management are primary foci of the Ministry of Environment Protection, the State Department of Protected Areas, and the Forestry Department. The Parliamentary Committee for Environment and Natural Resources is the principal body carrying out state policy and controlling parliamentary decisions according to the constitution.
The principal investment of the state in environmental protection is for water resources management; the relatively low levels of investment in other sectors are by the private sector (Table 4.8).

Table 4.8 Georgian State and private sector capital investment in environmental protection actions (1995)

	state capital investment (US$ 000)	**private sector capital investment (US$ 000)**
Water resources management	104.7	1,091.8
Air pollution treatment	....	177.1
Forest resources protection	....	.....
Fisheries	....	.....
Land and soil protection	....	0.4
Industrial pollution	....	3.3
Environmental protection and rational use of natural resources: TOTAL	104.7	1272.6

A new approach to the issue of environmental protection and sustainable development is closely related to several aspects:

- environmental education of society and public awareness;
- information exchange and communication;
- institutional capacity building;
- cooperation between central government, local administration and mountain communities;
- state environmental policy and economy:
- regional trans-border cooperation and environmental conventions (declarations).

4.4.3 Environmental NGOs and international assistance

The role of public organisations in the protection of environmental heritage is hard to overestimate. The environmental non-profit organisations in Georgia (Appendix 2) are vital, not only for increasing public awareness and environmental education among local community representatives, but also for their role in decision-making processes and during project implementation.

Today, of more than 3,000 registered NGOs, more than 50% focus on environmental protection, conservation and sustainable development. Most of them started their activities with grants and technical assistance from international organisations.

The most active funding institutions working on environmental conservation and providing assistance to NGOs in Georgia are: ISAR, Eurasia Foundation, and Save the Children (USAID), Georgian foundation "Horizonti", TACIS, and Open Society Georgian Foundation (OSGF: George Soros Foundation).

Recently, more and more environmental actions have focused on the development of mountain regions. The target is to help local communities increase their capacity and knowledge to manage social-economic conditions in respect of environmental protection and nature resource use.

4.5 Regional cooperation and institutional framework

Under the auspices of the Chairman of Parliament of Georgia, Mr. Zurab Jvania, the Parliamentary Commission on Environmental Protection and Natural Resources plans to organise a "Caucasian mountain environmental forum", a regional conference dedicated to discussing possibilities and action plans for preserving the environment of the Caucasus. One of the main goals of the Forum is to prepare the text of a "Caucasian Convention" and present this to the national governments. To this end, the Georgian parliamentary

commission established close links and collected relevant data from parliamentary institutions in Armenia, Azerbaijan, and Russia.

The Ministry of Environmental Protection of Georgia has actively participated over the last five years in the Black Sea Environmental Programme (with support from GEF and TACIS/PHARE) and the Georgian national parks programme (with support from WWF). The parliament adopted the "Georgian national parks and protected areas programme" and the "National strategic action plan". This programme (supported by WWF) initiated the establishment of a trans-border protected area between Dagestan and Georgia. Protected areas will be developed around Lagodekhi nature resort. The first consultation meetings were held in Kazbegi, in 1996. There is also a West Georgia - Kolkheti lowland nature park programme being implemented with support from the German government. A further desirable demonstration programme of regional cooperation could focus on the establishment of a cross-border park, emphasising cultural and biological diversity in the Mt. Kazbegi area of the central-east Caucasus between North Ossetia and Georgia.

Another existing initiative is the Caucasus Mountain Network (CMN), established in 1996 and part of the European Mountain Forum. The CMN is an electronic communication network (e-mail, Internet), dedicated to developing information exchange, mutual support and communication services between environmental organisations in the entire Caucasus. It needs further development, particularly the establishment of a coordination centre (in Tbilisi, Georgia) to implement the CMN information and communication network, and become a "Centre for Mountain Integrated Development". The centre will have a programme advisory board (representatives from different regions and countries of Caucasus) and select programme staff, and will work on fund-raising for programme development. Other activities will be to:

- establish links between different actors, such as national governments, local administrations, inter-governmental parliamentary commissions, environmental NGOs, and private business sector representatives;
- plan and organise regional workshops, to discuss problems and opportunities for the further development of the CMN. Funding for the first regional workshop was provided by George Soros Foundation regional programme "East-East", WWF, and OSGF;
- develop and establish regional (local) mountain nodes in the Caucasus; a network of local (mountain-based) NGOs dedicated to support the development of mountain communities. Four regional nodes are already established in the Georgian Caucasus;
- conduct and organise training courses and demonstration workshops for mountain communities. Workshops will hosted by CMN local nodes. During 1997, three workshops were organised in Kazbegi (Central-East Caucasus, Georgia);

- contribute to the process of regional consultation for mountain sustainable development in the Caucasus.

The coordination centre will support and facilitate the activities of the advisory board to organise broad consultation processes involving national governments, inter-governmental programmes, NGOs and representatives from international programmes and donor institutions. Consultation will be dedicated to help governments design a "Caucasus environmental declaration", with the further goal of designing a "Caucasian Convention".

5. Russian Federation

5.1 Krasnodarsky Kray

5.1.1 Introduction

Krasnodarsky kray is situated in Kuban and Prichernomorie, in the western Caucasus. It extends from the Azov and Black Seas in the west to the Stavropol highlands and the Bolshoi Zelenchuk river (the border with Stavropolsky kray) in the east; from Rostovskaya oblast in the north to Georgia in the south and Karatchaevo-Tcherkesskaya in the southeast. The kray completely surrounds Adygeia Republic. Krasnodarsky kray comprises 45 administrative raions, and 28 cities. Its has an area of 76,000 sq. km and a population of 5 million people. The capital is Krasnodar.

5.1.2 Landscape and Biological Diversity

5.1.2.1 Landscape Diversity

Krasnodarsky kray includes two major landscape types: the Kubanskaya plains and Great Caucasus mountains. There are 21 physico-geographical regions: six plains, three forest-plains, three flooded, and seven mountainous regions and two along the Black Sea coast.

The plains regions are: northeastern, northern, central Kubansky, Zakubansky, Kubansky starodeltovii (old delta), and Tamansky. They are characterized by an annual rainfall of 350-600 mm; various dry plains climates with variable snow cover in winter; and chernozem, southern chernozem, and brown nut soils. The plains are fully developed for agriculture.

The flooded regions are: Beisugo-Tchelbassky raion, Kubano-Protoksky, and Zakubansky. They are characterized by highly humid soils, wetlands, many open and closed lakes and bays, natural meadow vegetation, swamps (reed thickets, sedge and other swamps), and flooded meadows. A significant proportion of these flooded lands have been developed.

The forest-plains regions are: Anapsky (highly diverse), central forest-plains, and Jeltmessky. The former consists of mountain hills and low mountain ranges, with sea coast, plains and foothills forest-plains climates (500-600 mm of precipitation a year) and diverse soil types. In the highlands, the natural forest vegetation has remained intact. The latter two regions are sloping foothill plains at altitudes from 400 to 800 m. The climate is of a forest-plains type (600-700 mm of precipitation a year), and the area has been largely deforested, with the land being ploughed and occupied by fields and gardens.

The lowest mountain regions are the Lesopolny and Prikubanskie low hills and middle mountain broadleaf forests (< 1,000 m altitude) which, in the past, were fully covered by forests. Today, forests in the low hills remain only in the form of small 'islands'. The remainder has been developed for agriculture. The forests are dominated by oak, wild fruit, ash, maple, and white beech. There are also pine and beech. The Rocky range, Forward range, and the northern slopes and high mountains of the Main range differ in their physical and geographic characteristics. This results in a high diversity of flora and fauna: from mixed forests, dominated by oak and beech, to alpine wastelands; from forest animal communities that include Caucasus bison and red deer, to screes and rockfaces with mountain goat and serna.

Prikolhidsky raion differs from the others both in the range of abiotic conditions – marine climate, humidity, high annual precipitation (up to 3,000 mm a year) – and flora and fauna. In this region, relics (e.g., fruit yew, kolhidsky box tree) and chestnut forests are typical; the level of endemism is high; some animal species are either lacking or have small populations. The mountain regions are underdeveloped; the principal development consists of agriculture and animal husbandry (highland grazing land), as well as tourism.

The Black Sea coast region includes the Sochinsky subtropical and Northern Black Sea under-subtropical along the Black Sea coast (up to 300-400 m) with a marine climate, mountain forests, and humus-carbonate, brown, and yellow soils. The vegetation varies from relic rain forests to dry and mesophitic flora with many introduced species. The entire coast is heavily populated and developed.

5.1.2.2 Floristic diversity

There are over 3,000 species of vascular plants, and at least 500 species of fungi and lichen. The vegetation cover is extremely diverse. Four groups of plains can be distinguished: the dry grassy plains of the northeastern edge of the Kubanskaya plains and Tamansky peninsular, the typically grass-mixed herbs plains of the central part of Kubanskaya plains; and the meadows plains of the forest-plains zone in the southern part of Kubanskaya plains.

Ten groups of forests can be distinguished: low hills forests (dominated by rocky oak); mixed broadleaf (oak, white beech, maple, beech, aspen, ash, etc.), dominated by beech; pine, pine-oak and pine-fir; beech (widely represented); coniferous-beech and beech-coniferous (with Caucasus fir, eastern spruce); fir and coniferous; forests with alder (floodplain variety).

Subalpine vegetation (1,600-2,300 m) includes sparse forests, shrub thickets (willows, juniper, and rhododendron), high herbs, grassy subalpine meadows, and occasional bogs with moss and sedge.

Alpine meadow vegetation (2,100-2,800 m) includes grassy meadows (with fescue, matgrass, sedge etc.) with alpine low herbs; alpine mixed herbs;

meadows with lichen cover; alpine wastelands with rare species of *Saxifraga, Gentiana* etc., as well as epilite lichen flora.

5.1.2.3 Fauna diversity

The fauna includes at least 2,500 species of insects, 11 of amphibia, 20 of reptiles, over 300 of birds, and 86 of mammals. Eleven species of mammals, 24 of birds, two of amphibia and three of reptiles are in the Red Book of Russia. They include such rare species as European bison, Caucasus otter, *Mustela, Accipiter chrysaetos, Otis tarda, Circaetos gallicus, Plegadis falcinellus, Platalea leucorodia, Aquila rapax, Haliaeetus albicilla, Pelecanus crispus, Pelicanus onocrotalus, Falco peregrinis, Pandion haliaetus, Falco rusticolus, Otis tetrax,* and *Lyrurus mlokosiewiczi.*

The fauna of the lower agricultural lands is quite different from the mountain fauna, including hamster, pole cat, weasel, gopher, *Ellobins, Spalax, Dipodida,* bat and field mouse. Animals with "intermediate" habitat include *Erinaceida,* weasel, badger, wolf, fox, hare, otter, water rat, and Caucasus mole. Mammals specific to the mountains include Caucasus bison, red deer, bear, lynx, roe deer, and chamois. Jackal can be found mainly on the Black Sea coast.

Reptiles include *Vipera kaznakovi, Ophisaurus apodus,* and *Testudines*; the amphibia include *Bufonida bufo, Triturus alpestris,* and *Pelodytes caucasicus.* There are about 50 fish species, including 21 species in the mountain rivers of the northern and southern slopes, with brook trout being the most popular.

5.1.2.4 Specially protected natural areas and prospects for their development

The system of specially protected natural areas occupies almost 10% of the area of the kray. There are two State natural reserves. The Caucasus state natural biosphere reserve, established in 1924, is situated on the territory of three entities of the Russian Federation. Its total area is 280,300 ha, including 177,300 ha in Krasnodarsky kray. It includes parts of the mountain regions of the Rocky range, Forward range, northern slope and high mountain regions of the Main range, and the Prikolhidsky region. Sochi national park was established in 1986 on the southern macroslope, and is 193,700 ha in area. The main objective is to protect unique Kolhida forests in combination with their recreational use. However, for various reasons this SPNA does not meet the goals of a natural park (e.g., no research activities, violations of forest use rules, construction and mining).

The kray includes 11 sanctuaries, including two of republican significance (Table 5.1). All of them have been established in order to protect and conserve natural complexes. In accordance with the Regulation of the RF Government of April 23, 1994 N 572, all design works related to the establishment of reserve

"Utrish" in place of "Bolshoy Utrish" reservation were completed in 1998 and transferred to the RF State Committee on Ecology. The area designated within this reserve is unique in Russia, as the only area with Mediterranean landscapes and sparse juniper forest ecosystems.

Table 5.1 Sanctuaries of Krasnodarsky kray

	Significance	**Area (ha)**	**Note**
Priazovsky	Republic	45,000	
Sochinsky	Republic	48,000	Includes 33,200 ha within Sochi national park
Goriache-Kluchevsky	Kray	38,000	
Krasnaya Gorka	Kray	12,000	
Psebaisky	Kray	37,400	
Krynsky	Kray	30,000	
Tuapsinsky	Kray	15,000	
Belorechensky	Kray	20,000	
Novo-Berezansky	Kray	30,500	
Tamano-Zaporojsky	Kray	30,000	
Bolshoy Utrish	Kray	5,500	

There are more than 350 Nature Monuments, mostly in Prichernozemie. The protection regime, although envisaged, has not been institutionalized in any of them. As a consequence, many sites have lost their value as a result of their destruction.

5.1.3 Human influences on landscape and biological diversity

5.1.3.1 Land use structure

As of January 1, 1999, the land use structure of the 7,546,400 ha of Krasnodarsky kray was as follows:

- lands of agricultural organizations, enterprises and individuals: 63%;
- land under the control of municipal, town and village administrations: 8.1 %;
- land occupied by industry, transport, communications, radio broadcasting, defence, energy and other non-agricultural enterprises: 3.0%;
- specially protected natural areas: 4.9%;
- forests: 15.9%;
- water resources: 4.6%;
- reserved land: 3.4%.

As a result of land reform, there have been changes in the land use structure, such as an increase of 120,600 ha in the area of agricultural land, and the ploughing of reserved land.

5.1.3.2 Forestry

There are 1,695,700 ha of forests, covering 22.5% of the kray. Principal species include: oak (53.5%); beech (20%); conifers (6.5%); other deciduous (aspen, birch, maple etc.: about 20%). The available forestry resources are all protected (first-group) forests; 79% are controlled by Krasnodarsky Forest Authority, 10.1% by the State Committee on Environment Protection, and 8.3% by the Ministry of Agriculture and Food.

Within the kray are commercial logging (both selective logging and clearcutting), intermediary cuttings, support forest use, and forest improvement works. There has recently been a drastic reduction in the estimated cutting area intended for commercial development. In 1998, its volume was 834,600 m^3, of which only 18.0% was actually harvested.

There are regular fire and forest protection activities. The area on which forests were restored in 1998 was twice as large as the area of clearcuts. However, illegal logging has been conducted on a dangerous scale. In 1998, there were 438 cases of illegal logging; as a result, preventive measures have been taken. Forest use technologies (particularly mountain logging) are generally environmentally unsound.

5.1.3.3 Agriculture

There are 4,783,600 ha of agricultural land, including ploughed fields (88.5%); fodder fields (8.6%); and perennial crops (2.9%). The condition of agricultural

lands is close to critical, and land degradation processes could soon become irreversible.

In all the agricultural zones, yields depend on soil fertility – and critical elements are lacking. This problem can be addressed through fertilization and the optimization of crop rotations. Irrigated lands occupy 8.3% of the total area of agricultural land; they include both technological rice cultivation systems and rainfed systems. Irrigation has generally had negative effects on the state of chernozems. Due to decreased investments in land improvement, some areas are now excluded from usage.

The negative impact of agricultural activities on the kray's water and land resources is estimated to be very high. Nitrate and pesticide pollution at "moderately dangerous" and "dangerous" levels has been registered on 4.1% of the kray's area, soil leaching on 14.9%, salinization on 8.8%, and overapplication everywhere.

5.1.3.4 Recreation and tourism

Krasnodarsky kray is one of the leading regions of Russia for recreational-tourist, sanitary-health resort and services. The health resort and tourist facilities comprise more than 1,000 enterprises with a total of 188,000 beds and 450,000 personnel, who in the past provided services to 10-12 million tourists a year. After eight-ten years of marked decline in demand for sanitary-health resort and tourist services, these activities are gaining momentum once again.

The main recreational and tourist potential of the kray is concentrated along the Black Sea coast (Sochi and Gelenjik, Anapa and Tuapse health resorts), with some facilities in the foothills of the northern macroslopes of the Caucasus. Due to the considerable load on recreational resources and the general social and economic instability in Russia, the state of the environment of the Black Sea coast has worsened dramatically. This has included excessive air, water and soil pollution; degradation of sanitary conditions; depletion of natural - including recreational - resources (destruction of natural complexes and sightseeing locations). To preserve and restore such sites, the kray has adopted the Law "On natural medical resources, treatment and recreational sites and resort houses of Krasnodarsky kray" and implementation of integrated nature protection activities has been planned and begun.

5.1.3.5 Hunting and fishing

Krasnodarsky kray is inhabited by over 300 species of birds and 86 species of mammals, including game animals. Mammals include fox, marten, squirrel, hare, jackal, wolf, lynx, bear, boar, roe deer, and red deer as well as rare and protected species, including Caucasus bison, chamois, Caucasus otter, pole cat,

Accipiter chrysaetos, Otis tarda, Circaetos gallicus, Haliaeetus albicilla, and *Lyrurus mlokosiewiczi.*

Recent social and economic developments (including drastically increased illegal hunting) have resulted in the reduction in the number of the main species of game animals. In the last 13 years, the number of deer decreased by 27%, boar by 49%, roe deer by 52%; and the number of fur animals (muskrat, marten, raccoon) also continues to decrease. The prohibition of ungulate hunting and licensing of the hunting of fur animals are becoming very acute.

It is extremely vital to maintain the number of the main target game species in the kray's hunting reservations. There are 11 reservations, with a total area of 113,400 ha, including two of republican significance: Priazovsky and Sochinsky. Although they occupy only 4.2% of all the kray's hunting grounds, about a third of the wild ungulates are concentrated in them. The kray's hunting grounds face an ever-increasing burden aggravated by continuous decreases in the scale and efficiency of bio-technical and protection activities. There are more than 80,000 hunters in the kray, and the population possesses more than 150,000 firearms.

Due to the unregulated harvesting of non-game species (amphibia, reptiles, majority of insects, non-game birds etc.) for hunting and fishing, their number has also decreased and requires adequate action.

The fishing resources include 473 rivers with a length of 14,000 km, of which 23 (total length 5,783 km) are specially protected. The fishing area of the Black Sea is 56,200 sq. km, and of the Azov Sea, 11,000 sq. km. A total of 1,922 sq. km is specially protected aquatic territory. The species composition of ichthyofauna is extremely rich and includes such valuable species as sturgeon, *Stizostedion, Abramis, Rutilus rutilus,* pilengas, *Pleuronectes, Clupeonella,* hamsa, *Sprattus,* carp, *Carassius, Tinca tinca, Hypophthalmichthyna, Silurida,* stream trout, rybets, and shemaia.

The bulk of the commercial catch consists of hamsa and *Sprattus* (in the Black Sea up to 90% of the total catch). The industrial catch of sturgeon has halved, while carp and bream stocks and catches are more stable. Species such as pilengas, rybets, and shemaia have become very rare. Amateur fishing is conducted everywhere. In the last decade, the problem of conserving and restoring fish reserves has become extremely urgent. In addition to the the Azovsky and Krasnodarsky fishing research institute, there are 11 operational fish-breeding enterprises: four sturgeon breeding plants, a pilot industrial salmon breeding plant, a fish breeding station, and five spawning and breeding farms that replenish fishing resources of Azovo-Kubansky and Black Sea basins.

5.1.3.6 Mineral resources

The mineral resources include hydrocarbon resources, non-ferrous metals, non-ore mineral resources, underground waters (fresh, mineral and thermal), facing and coloured stones. More than 250 deposits of construction materials (clay, sand, marl) have been industrially developed; with an annual total output varying from 20 to 8.5 (1998) million m^3. Over a dozen oil and gas fields are being developed, with an annual extraction of 1.5 million tons a year from the 340 million tons of oil reserves, and 1.7 billion m^3 of gas production.

As of January 1, 1999, there were 2,801 ha of degraded mountain land, and 1,498 ha of depleted land. In 1998, 180 ha were recultivated.

5.1.3.7 Air pollution

Levels of air pollution vary across Krasnodarsky kray and are rather high. In 1998, the gross emissions were 888,816 tons. Of these, 784,412 tons were released by road transport and 83,649 tons by industrial (fixed) sources. Emissions include carbon dioxide (68.3%); nitrogen oxide (8.0%); sulphur dioxide (2.1%); organic compounds (15.5%).

Anthropogenic impacts on air quality are proportional to the level of urbanization. Thus, the indicators of air pollution in Sochi and the health resorts do not exceed the standards, and levels in villages and towns are a tenth or less of those in Krasnodar (111,594,000 tons in 1998) or Novorossiisk. In these, the most industrially developed and the least environmentally safe cities, the integrated rate of pollution for five prevailing pollutants exceeds the maximum permissible concentration (MPC) by 3.5 times.

In the last decade, the volume of emissions generally halved. Decreases in the volume of emissions from industrial and fixed sources mainly resulted from the considerable fall in production. Reductions of emissions from road transport and mobile sources are related to reduced consumption of all types of fuels, including ethylated gasoline, as well as regular supervision activities. The kray's authorities pay increased attention to air protection. From 1991 to 1998, they organized and implemented 1,650 air protection activities which made it possible to reduce the total volume of emissions on average by 30%.

The kray is covered by the International Convention on Transboundary Air Pollution and Ozone Layer Protection which covers all types of air pollutants. To date, the requirements of the first and second stages (reduction of sulphur compounds emission by 30% and 40% respectively) have been met.

5.1.3.8 Water pollution

The water resources of Krasnodarsky kray include 22.56 km^3 of surface waters; 4.3 million m^3 per day of underground waters, and the waters of the Black and

Azov Seas. The water intake limit for 1998 was set at 6,970 million m^3 per day; the current intake from natural sources (including underground sources) is 7,605 million m^3 for the following purposes: industry (36.8%); agriculture (38.6%); household (6.2%); other (18.4%).

The condition of the surface water resources is considered unsafe. The most polluted waters include the Kuban river and Eastern Priazovie watersheds. The waters near the Black Sea coast are somewhat cleaner. The most frequent pollutants in surface waters are oil products (one to six times MPC), copper and iron-containing compounds (one to 24 times MPC), easily oxidized organic substances (up to three times MPC), phenols (two times MPC), ammonium and nitrite nitrogen, phosphates, and hydrogen sulphide (within the permissible level). In general, the quality of underground waters complies with the established hygienic norms.

A total of 5,782.91 million m^3 of water drains annually into the natural environment, including 1,910.75 million m^3 of polluted waste waters. These include 1,715.60 million m^3 without any purification, including 1,703.74 million cubic tons of waste waters from rice systems polluted by pesticides. The 177 water purification complexes receive 89.1% of industrial and household waste waters requiring purification. After purification, about 42.6% of discharged waters comply with MPC norms.

In recent years, the state of the ecosystems of the Black and Azov Seas has been considered unsafe with respect to pollution criteria.

5.1.4 Natural resources management

The planning of land use and natural resources management is conducted by the State bodies which manage, regulate and supervise all the kray's natural resources. The system of State nature use and environment protection management is based on site monitoring (land resources, flora and fauna, etc.) supervision and inspection activities, ecological expertise and licensing; for the largest enterprises, Maximum Permitted Emissions (MPE) and MPC norms have been established, and Maximum Permitted Dissolved Solids (MPDS) norms are being prepared. In the kray, seven federal programmes are being implemented, and a legal framework for regional nature protection has been developed which includes six laws of the kray, two regulations of the kray's Legislative Assembly, 17 dispositions and resolutions of the kray's head of administration, and two resolutions of Krasnodar Municipal Council.

5.1.5 Cooperation: state and non-governmental organizations

The state bodies which monitor the natural resources and research organizations cooperate with the public ecological organizations. This cooperation is manifested in joint checks of forest use, support forest use, and subsoil use, as well as joint (with the kray's scientific community) public political activities (for example, a "Way Through" campaign), seminars and workshops.

5.1.5.1 Public ecological organizations

Many public ecological organizations are active in Krasnodarsky kray and Adygeia Republic, which it surrounds (Appendix 2). On the basis of their practical activities (e.g., addressing particular ecological concerns, ecological education, training or informational activities), they can be divided into two main groups: real and existing only on paper. Instrumentally this is determined by the presence of reliable information on these organizations' practical activities. Another classifying feature of public ecological organizations is their interaction with governmental organizations. Recently, governmental organizations have tended to initiate the establishment of pseudo-public ecological organizations; by manipulating such institutions they can pretend that these public ecological organizations actually support certain activities of state bodies. Yet another feature used for classifying public organizations engaged in ecological activities is the priority of ecological activities within the organization's goals and objectives. Many organizations engage in ecological activities indirectly while carrying out their priority objectives. These mainly include organizations focusing on tourist and regional exploration, as well as scientific and public institutions. In reality, many public ecological organizations consist of just one person actively involved in environmental protection.

The most powerful ecological organizations of the region

The Social and Ecological Union of the Western Caucasus operates in Krasnodarsky kray, Adygeia Republic and Karatchaevo-Tcherkessia. It is an inter-regional association of the offices of the International Social and Ecological Union in these entities of the Russian Federation, consisting of more than 20 local public environmental organizations, as well as individual environmentalists. The Union is most active in Adygeia Republic.

The Azovo-Black Sea NGO Network is regional NGO network which includes organizations of Krasnodarsky kray, Adygeia and Rostovskaya oblast. It is a part of the International Black Sea NGO Network.

Kubanskaya Peoples' Academy is the oldest public ecological organization in Krasnodarsky kray. It operates mainly in Krasnodar, with offices in different

cities of the kray. It is currently concerned mostly with the issues related to conditions for the region's sustainable development. It maintains close interaction with state bodies.

The Independent Ecological Service for the North-Western Caucasus (Maikop) is a professional public ecological organization, a public institution with the International Social and Ecological Union.

5.2 Adygeia Republic

5.2.1 Introduction

The Adygeia Republic is in the northwestern part of the Main Caucasus range. It has an area of 781,400 ha and is surrounded by Krasnodarsky kray. The population of 499,000 people live in seven administrative raions and two cities: Maikop (the capital of the Republic) and Adygeisk (Table 5.2).

Table 5.2 Administrative structure and population of Adygeia Republic

Raion	Area (ha)	Population (000)	Towns
Takhtamukaysky	46,650	64.8	None
Teuchejsky	73,036	34.3	Adygeisk
Krasnogvardeisky	72,552	31.7	None
Koshehablsky	60,581	31.3	None
Shovgenovsky	52,154	17.6	None
Giaginsky	75,700	34.8	None
Maikopsky	400,577	108.7	none
Maikop	Over 32 sq. km	175.8	-
TOTAL	781,400	499	2

The natural conditions of the Republic are extremely diverse, for a variety of reasons: its north-south orientation, with natural zones from *zakubanskie (transkuban)* plains to the Main Caucasus range, including the entire vertical range of landscapes and biocoenoses both in their classic form and with different variations in natural and artificially modified condition; its location at the juncture of three zoogeographic sub-regions and two geobotanical provinces; the presence of "Kolkhidsky Gates"; and the mutual penetration of flora and fauna elements.

5.2.2 Landscape and biological diversity

5.2.2.1 Landscape diversity

The Republic is situated on the left bank of the Laba and Kuban rivers. Its northern part is located on the Prikubanskaia plains, on the river terraces of the Kuban and Laba rivers, extending to the line between Maikop and Labinsk. Its foothill part occupies flat mountain slopes at altitudes of 500-800 m. Its southern part includes the slopes of Greater Caucasus up to 3,238 m in the Tchugush mountains. The climate is characterized by short winters, mild summers, and a prolonged dry and warm autumn.

Adygeia's plains are part of the Priazovo-Kubanskaia lowlands, an extension of the Eastern European plains zone. Their altitude is 100-200 m, and annual rainfall is 500-600 mm. The soils are various types of chernozems, and the natural vegetation communities are wormwood-grass plains. The plains are fully developed for agriculture, with strips of forest; these cultural landscapes have an acquired forest-field character.

The natural vegetation of foothills is forest-plains. The climate is rather humid; the well-developed soils are chernozems and grey forest soils. Most of the forest plains belt has been changed by human activities, such as ploughing and horticulture; most of the forests have been destroyed.

Forests are widespread at altitudes 400-2,200 m; they consist of broadleaf, mixed, and coniferous forests and elfin woodlands on brown forest and gray mountain forest soils. The degree of influence of human activities varies; some forests are in almost virgin condition.

Subalpine and alpine meadows (1,600-3,000 m) are located on the Main, Side and Forward ranges, on mountain meadow soils. Large areas of subalpine meadows (Lagonaki plateau, Thach mountain) have long been used for grazing and have been considerably modified, while alpine meadows are practically intact. There are also high mountain landscapes, with nival and sub-nival belts and glaciers.

5.2.2.2 Floristic diversity

Due to the variety of physical and geographic conditions, and the opportunity for the migration of Tertiary plant species from the coast of the Black Sea through the Kolkhidsky Gates into the Belaya river basin, the floristic diversity of the Republic is high. It is estimated as including 2,500 species, including 1,580 vascular plant species of 121 families; there are over 280 species of moss, lichen, mushroom and algae. Rare and disappearing species include 20 species of mushrooms, 26 of lichen, one gymnosperm, five ferns, and 97 species of angiosperms.

Structurally, the vegetation cover is extremely diverse. A range of distinct zones or belts can be distinguished. From north to south, the communities of wormwood-grass meadow plains are replaced by forest plains and forests. These are dominated by oak and white beech, then eastern beech in the broadleaf forests; Caucasus fir and eastern beech in mixed forests; and Caucasus fir and Sosnovsky pine in elfin woodlands. There are also relic species such as yew, box, holly, cherry laurel, butcher's broom, and rhododendron (*R. caucasicum, R. ponticum*). In the mountains, the local species diversity of herb communities is estimated at 1-50 species per 16 m^2; the regional diversity includes over 900 species.

5.2.2.3 Fauna diversity

The species composition of Adygeia's fauna is highly diverse, due to the Republic's location at the juncture of three zoogeographic sub-regions: Mediterranean, Euro-Siberian, and Central Asian. The vertebrate fauna consists of 384 species, some relic and endemic, which are on the verge of extinction or are rare in Russia or globally.

There are over 2,500 species of insects, 38 of which are registered in the Red Book of Russia. There are also more than 45 fish species, five of which are listed in the IUCN Red Book; and 11 species of amphibia, four of which are in the Red Book of Russia and the IUCN. Of the reptiles, 30% are endemic; 20 reptile species are designated as protected at the Russian scale.

Of the 246 bird species, nearly half are nesting birds; 24 are registered in the Red Book of Russia and 10 in the IUCN Red Book. There are many species which have limited habitats or are endemic.

There are 81 species of mammals, 11 of which are listed in Russia's Red Book and 17 in the IUCN Red Book. About 60% of the species are small animals, including 20 species of bats, 23 of rodents, 17 of predators and seven of ungulates. Rare mammals include the Caucasus otter, Caucasus badger, Caucasus lynx, and Caucasus (mountain) bison.

The Red Book of the Adygeia Republic includes four species of amphibia, six of reptiles, six of fish, 41 of birds, 15 of mammals, and 113 of insects.

5.2.2.4 The system of protected areas and their development

There are 32 specially protected and protected natural areas in the Adygeia Republic, occupying 12.6% of the Republic's territory (Table 5.3).

Table 5.3 Protected natural areas of Adygeia Republic (January 1, 1999)

	Status (category)	**Regulatory act and date of establishment**	**Raion, area (ha)**	**Significance and jurisdiction**	**Condition**
Adygeia affiliate of the Caucasus state natural biospheric reserve	State natural biospheric reserve	Caucasus reserve - Decree of the SPC of the RSFSR of 12.05.1924; Adygeia affiliate - Order of the RF Minpriroda N 209 of 5.07.1994	Maikopsky; main area 90,154; protected zone 4,900	Global significance, federal	Unsatisfactory - financing, protection and research are insufficient
Natural park of the Adygeia Republic "Bolshoy Thach"	Natural park	Decree N 244 of 8.10.97	Maikopsky; 3,075	Republican	Unsatisfactory - financing, protection and research are insufficient
Maikopsky botanic sanctuary	Biological natural sanctuary	Decision of the oblast's executive committee of 26.04.91 N 112	Maikopsky; 5,400	Republican	Satisfactory
Kujorsky botanic sanctuary	Biological natural sanctuary	Decision of the oblast's executive committee of 26.04.91 N 112	Maikopsky; 1,117	Republican	Satisfactory
Dahovsky state sanctuary	Complex natural sanctuary	Decision of the oblast's executive committee of 5.12.91 N 327	Maikopsky; 23,000	Republican	Insufficient protection
Shovgenovsky state sanctuary	Biological natural sanctuary	Decision of the oblast's executive committee of 5.12.91 N 327	Shovgensky; 19,500	Republican	Insufficient protection
Nature Monument "Headwaters of Psheha and Pshehashha rivers"	Nature monument	Decree of 23.12.97 N 274	Maikopsky; 5,776	Republican	Insufficient protection

Nature Monument "Headwaters of Tsitse river"	Nature Monument	Decree of 23.12.97 N 274	Maikopsky; 1,913	Republican	Insufficient protection
Nature Monument "Buiny ridge"	Nature Monument	Regulation of 9.12.96 N 467	Maikopsky; 1,470	Republican	Satisfactory
Nature Monument "Rufabgo river valley"	Nature Monument	Decision of the raion's executive committee of 31.05.79N 317	Maikopsky 150	Local	Unsatisfactory - insufficient attention from the local administration
Nature Monument "Granite canyon"	Nature Monument	Decision of the raion's executive committee of 31.05.79 N 317	Maikopsky; 400	Local	Satisfactory
Nature Monument "Polkovnitskaya balka"	Nature Monument	Decision of the oblast's executive committee of 17.02.89 N 59	Maikopsky 600	Local	Unsatisfactory - insufficient attention from the local administration
Nature Monument "Hajohskaya tesnina"	Nature Monument	Decision of the raion's executive committee of 31.05.79N317	Maikopsky; 5	Local	Satisfactory
Nature Monument "Monah mountain"	Nature Monument	Decision of the raion's executive committee of 28.11.73 N 644	Maikopsky; 5	Local	Satisfactory
Nature Monument "Bear nut wood"	Nature Monument	Decision of the raion's executive committee of 28.11.73 N 644	Maikopsky; 7.5	Local	Satisfactory
Nature Monument "Kazachy stone"	Nature Monument	Decision of the raion's executive committee of 28.11.73 N 644	Maikopsky; 0.3	Local	Satisfactory
Nature Monument "Monastyrskaya cage"	Nature Monument	Decision of the raion's executive committee of 08.04.82 N 152	Maikopsky; 0.01	Local	Unsatisfactory - insufficient attention from the local administration

Nature Monument "Amur cork wood"	Nature Monument	Decision of the raion's executive committee of 12.02.80 N 136	Maikopsky; 2.6	Local	Satisfactory
Nature Monument "Arax oak"	Nature Monument	Decision of the raion's executive committee of 12.02.80 N 136	Maikopsky; 0.01	Local	Satisfactory
Nature Monument "Soldatsky spring"	Nature Monument	Decision of Maikop municipal executive committee of 08.06.88 N 1500	Maikop city; 0.25	Local	Satisfactory
Recreation zone "Central"	Nature Monument	Decision of the raion's executive committee of 08.01.86 N 1	Giaginsky; 20	Local	Satisfactory
Recreation zone "Dalnaya"	Nature Monument	Decision of the raion's executive committee of 08.01.86 N 1	Giaginsky; 20	Local	Satisfactory
Recreation zone	Nature Monument	Decision of the raion's executive committee of 31.03.92 N 170	Giaginsky; 24	Local	Satisfactory
Recreation zone	Nature Monument	Decision of the raion's executive committee of 31.03.92 N 170	Giaginsky; 40	Local	Satisfactory
Recreation zone	Nature Monument	Decision of the raion's executive committee of 08.01.86 N 1	Giaginsky; 35	Local	Satisfactory
Nature Monument	Nature Monument	Decision of the raion's executive committee of 23.03.78 N 351	Giaginsky; 0.1	Local	Satisfactory

Nature Monument	Nature Monument	Decision of the raion's executive committee of 28.09.88 N 232	Teuchejsky; 0.1	Local	Satisfactory
Nature Monument	Nature Monument	Decision of the raion's executive committee of 25.10.85 N 328	Koshehablsky 0.1	Local	Satisfactory
Nature Monument	Nature Monument	Decision of the raion's executive committee of 25.10.85 N 328	Koshehablsky 0.1	Local	Satisfactory
Nature Monument	Nature Monument	Decision of the raion's executive committee of 29.04.80 N 200	Teuchejsky; 20	Local	Satisfactory
Nature Monument	Nature Monument	Decision of the raion's executive committee of 05.03.86 N 86	Teuchejsky; 5.0	Local	Satisfactory
Nature Monument	Nature Monument	Decision of the raion's executive committee of 26.11.73 N 644	Maikopsky 0.2	Local	Satisfactory
ETT "Fisht"		Decree of the RA President N 85 of 30.05.94	Maikopsky; 119,000	Republican	

The priority focus for the development of the Adygeia Republic's protected area network has shifted from its expansion to its optimization; the improvement of the qualitative condition of the existing protected areas.

5.2.3 Human influences on landscape and biological diversity

5.2.3.1 Land use structure

As of January 1, 1999 the land use classification of the 781,400 ha of the Republic was: agriculture (49.5%); human settlements (5.1%); industrial,

transport, communication and other uses (1.8%); special protected natural areas (12.6%); forests (24.4%); water resources (6.1%); and reserve lands (0.5%). The 1998 structure of land use was as follows:

- agricultural lands: 43.3%; personal farms, individual housing: 2.8%; collective fruit gardens: 3%; collective vegetable gardens: 0.4%; animal husbandry, including fodder fields: 0.3%;
- forest areas and parks: 37.0%; trees and shrubs: 1.0%;
- wetlands: 0.5%; water: 6.9%;
- squares, streets, roads: 2.4%; developed land: 2.1%;
- degraded lands and rehabilitated lands: 0.1%; other lands: 2.9%.

5.2.3.2 Agriculture

Agricultural land covers 43.3% (338,500 ha) of the Republic, including ploughed fields (243,100 ha), perennial crops (2,900 ha), and fodder fields (92,200 ha). Agricultural enterprises have certain impacts on the condition of land and water resources. In 1998-1999, about 64 million m^3 of water were used for agricultural needs, and 59 million m^3 for irrigation. Water intake from fishery ponds amounted to about 65.1 million m^3. More than 2,500 tons of pollutants were discharged into surface waters.

About 1.03 kg of pesticides were introduced per ha of ploughed field. In total, the farms store 10.3 tons of unusable pesticides, some in inadequate storage facilities which pose considerable danger. The issue of storage and utilization of 76.45 tons of dangerous chemicals which have become unusable and are stored in the territory of OSC "Lukoil-Krasnodar-Oil Product" requires urgent action.

Despite the closure of many livestock farms and a reduction in the number of livestock, the issue of river pollution by water containing manure is highly acute. A total of 101 farms are located in water protection zones, and 18 on river banks.

5.2.3.3 Forestry

The area designated as forest is 333,000 ha, while the area covered by forest is no more than 280,000 ha. The main forest-forming species are fir, pine, beech, white beech, oak, ash, maple, aspen, and birch. The main owners and users of the forest resources are: Rosleshoz, Federal Forest Agency (191,800 ha) and Ministry of Agriculture (40,100 ha). Logging is conducted on 241,500 ha. In 1998, the estimated forest stock of Rosleshoz was 281,000 m^3, but only 17.3% was being utilized. Forests that belong to 61 agricultural entities are degraded as a result of irregular logging. Their estimated forest stock is 40,600 m^3; only 15% is being utilized. Potentially fire-prone coniferous forests occupy 54,600 ha. Each year, there are five or six small forest fires of c. 20 ha.

Annual emissions of pollutants by forestry, logging and paper and pulp enterprises are about 293.6 tons.

5.2.3.4 Recreation and tourism

Until the early 1990s, tourism, especially pedestrian tourism, was one of the most developed industries in Maikopsky raion. Tourist enterprises in Adygeia had a well-developed structure; the services of these enterprises were highly valued within the entire USSR. Since the early 1990s, the scale of tourist activities has been decreasing.

The main tourist sites have been and remain sites of natural interest, as well as monuments of history and culture (45 protected natural areas, over 150 historic and cultural monuments).

The Republic has five tourist enterprises and a well-structured monitoring and safety service. There are three official tourist routes (which in the past were of ail-Union significance) connecting Adygeia and the Black Sea coast - N 30, N 825 and N 828 - as well as more than a dozen routes across Maikopsky raion. The Committee on Tourism, Physical Culture and Sport of the Adygeia Republic, together with other stakeholders, regularly conducts sport and tourist trips of both all-Russian ("Interrally", "Transcaucasus marathon") and republican significance and carries out activities to define the recreational carrying capacities of specially protected natural areas.

5.2.3.5 Hunting and fishing

The hunting grounds of the Adygeia Republic cover 703,200 ha; 30% in forests, 49% on fields, 8% on water basins, and 13% on other lands. Hunting grounds are under the authority of two State reservations and four hunting farms. The largest hunting farms include Adygeia republican societies of hunters and fishermen (six sites on 555,600 ha) and the State hunting farm "Alota" (four sites on 66,100 ha).

On the hunting farms one can find duck, goose, fox, marten, squirrel, hare, jackal, wolf, lynx, boar, roe deer, dapple deer, mountain goat, serna, red deer, bear, and Caucasus bison. At the present time, hunting of the three latter species is prohibited; roe deer and boar are licensed game animals, while mountain goat and serna will soon be listed in the Red Book of Adygeia Republic.

The reproduction of hunting resources is ensured by a set of biotechnical activities: supplementary feeding, resettlement of game animals, prevention of their loss as a result of natural disasters and disease, veterinary and preventive activities, and regulation of the number of wolves. The state of populations of game animals is positively affected by the reduction of the intensity of logging and agricultural activities.

Adygeia includes 131 small rivers, 294 ponds and six reservoirs where amateur and commercial fishing takes place. Adygeia's waters are inhabited by at least 54 fish species, including carp, bream, gold and silver carass, tench, white amur, *Hypophthalmichthyna,* sheatfish, pike perch and stream trout. Commercial harvesting is conducted only in Krasnodarsky (40,000 ha) and Shapsugsky (4,750 ha) reservoirs by fishery enterprises of the "Adygeiarybhoz" association. In 1979, the annual catch was 685 tons. In recent years, these figures have considerably decreased. In 1998, the stock was estimated at 383,000 kg, and the catch at 158,791 kg. The main game species include carp, pike perch, and bream. There is an efficient fish protection inspection which conducts two-month campaigns for protecting species of fish that spawn in spring.

5.2.3.6 Mining enterprises and quarries

The most valuable mineral resources of the Adygeia Republic include hydrocarbon resources - natural gas (two fields), gas condensate (five fields), oil (one gas and oil field) - underground waters (four aquifers), non-ore mineral resources, and agro-ores. Extraction to date has included 70 billion m^3 of gas, four million tons of gas condensate, and 114,000 tons of oil. In 1998, 1,640,000 m^3 of gravel and sand, 380,000 m^3 of clay, 830,000 m^3 of sand, 543,000 m^3 of lime, and 59,900 m^3 of gypsum were produced.

There are five oil and gas producing enterprises, 41 enterprises licensed to extract non-ore mineral resources, 79 underground waters, five to extract mineral and thermal waters, and two to extract precious metals. The largest enterprise which extracts lime and gypsum is "Nerudstroikom" (in Kamenomostsky town). Clay, sand and gravel are produced from six other large quarries.

5.2.3.7 Air pollution

In the last five years, air pollution levels have not been high. The total gross emission of pollutants into the air is 64,260-66,610 tons. Emissions from mobile sources exceed those of fixed sources by 2.6-7.4 times; in 1998, emissions from road transport were 86% of the total. Pollutants include: sulphur dioxide (6.2%); carbon dioxide (34%); nitrogen oxides (8.2%); hydrocarbons (1.6%); ammonia (2.0%); other (48%). Fixed sources - public utility enterprises, agriculture, construction industry, lumber and paper and pulp industry - are major sources of air pollution. Overall, 1,015 enterprises discharge pollutants into the air.

Emissions vary considerably across the different administrative entities of the Republic; those from Maikop (40.9%) are much higher than from the raions: Takhtamukaysky (16.4%); Maikopsky (14.7%); Teuchejsky (8.5%);

Krasnogvardeisky (6.5%); Giaginsky (6.5%); Koshehablsky (4.9%); and Shovgenovsky (1.6%).

Adygeia State bodies carry out activities aimed at protecting air resources, including the inventory and licensing of emissions, operation of the "Atmosphere" state enterprise, operation "Clean Air", and monitoring air quality. The Cabinet of Ministers of the Adygeia Republic has passed a regulation prohibiting the use of ethylated gasoline.

5.2.3.8 Water pollution

The surface waters comprise 131 small rivers with 3,120 affluents, as well as Krasnodarsky, Takhtamukaysky, Shengiysky, Chetuksky, and Maikopsky reservoirs and 294 ponds. The volume of underground waters is estimated at 115 million m^3 a year; three deposits of fresh water, four of mineral water, and one of thermal water have been explored and developed.

The total volume of water used in the last five years has been 235.9 - 380.7 million m^3 a year. Percentage uses of water for different purposes in 1998 were: household and drinking (23.2%); industrial (4.4%); irrigation (32.9%); agriculture (1.6%); pond and fish farms (37.8%); other (0.1%). The main water users are in Maikop, and Teuchejsky, Takhtamukaysky and Koshehablsky raions. Water use in general in the Republic can be characterized as wasteful; more than twice the normative level in the public utilities and agricultural sectors.

Water pollution is a serious concern. There are 58 purification facilities (which processed 47.2 million m^3 of waste waters in 1998), 23 of which are non-operational, and have even become sources of pollution themselves. Maximum permitted concentrations of many chemicals, including heavy metals, are constantly exceeded. Organic and mineral fertilizers released into water due to non-compliance with the regime regulating activities in water protection zones account for a considerable proportion of the total volume of pollution. However, quality control of surface and ground waters is conducted in the largest rivers of the Republic at hydro-posts and water release points of water purification facilities.

5.2.4 Natural resources management

Land use planning and resource management is conducted by the State bodies which manage, regulate, and monitor the natural resources. The Republic has taken a number of steps aimed at ensuring sound use of its natural resources and the improvement of the legal framework for nature protection:

- the return of the Fisht-Oshten mountain massif (1992) and the meadows of the Lagonaksky highlands to the Caucasus State Biospheric Reserve;

- establishment of specially protected natural area "Fisht" (1994) and natural park 'Bolshoy Thach' (1997);
- declaration of the headwaters of the Tsitsa, Psheha and Pshehashkha rivers, as well as Buiny ridge, as nature monuments of Republican significance (1997);
- measures aimed at strengthening protection and provision of conditions for Caucasus bison and the conservation of other rare species of fauna and flora (1999);
- maintaining the Red Book of the Adygeia Republic.

The legal framework for nature protection can be considered relatively developed. Besides the existing Federal laws and regulations, four local laws have been enacted in Adygeia Republic: "On the ecological safety in the territory of Adygeia Republic"; and "On industrial and household wastes"; "On tourism"; "On forests".

A draft law on specially protected natural areas of Adygeia Republic has been elaborated, and other nature protection decrees and regulations of the AR President and the RA Cabinet of Ministers are in force. All required supervision and inspection activities are conducted. A targeted federal programme entitled "Social and economic development of Adygeia Republic in 1998-2000" has been implemented.

5.2.5 Cooperation: academic and non-governmental organizations

The Adygeia Republic is rich in qualified personnel, including professors and postgraduate students of higher educational institutions (Adygeia state university, Maikop state technological institute) with experience of joint work and international cooperation acquired through:

- the implementation of two projects - "Adygeia: sustainable development of the mountain region" and "Integration" (within the framework of the federal programme) - as well as other joint activities (republican conferences and expert meetings in the field of nature protection);
- joint preparation of materials for the successful inclusion of the "Western Caucasus" in the World Natural Heritage list (1999);
- joint participation of nature protection organizations of the Republic in the development and expertise of the legislative acts of Adygeia Republic relating to nature protection policy.

Regular working contacts are maintained between the academic and nature protection public organizations (VOOP, Adygeia republican public association RED, RES, ecological community "Atshy", ecological informal youth association EcoNOM, sports public youth organization "Ruslan"). See also

section 5.1.5.1 and Appendix 2 for further details of NGO activities in the region.

5.3 Karatchaevo-Tcherkesskaya Republic

5.3.1 Introduction

The Karatchaevo-Tcherkesskaya Republic (KTR) is situated in the northwest Caucasus. Its borders are, to the south, with Georgia and Abkhazia across the Main Caucasus range; to the west with Krasnodarsky kray; and to the north and northeast with Kabardino-Balkaria. The Republic has an area of 14,300 sq. km, a minimum altitude of 400 m and a maximum altitude of 5,642 m (Elbrus - the highest peak in the Russian Federation and Europe).

As of January 1, 1999 the population of the Republic was 438,300 people, including an urban population of 193,000 people; the average population density was 30.5 persons per sq. km. KTR consists of eight raions, with two cities under republican jurisdiction, two cities under raion jurisdiction, 11 towns of industrial and recreational significance, and 148 other settlements (Table 5.4). The capital is Tcherkessk city. A total of 86 large enterprises are operational; the agro-climatic resources of the KTR are favourable for agriculture, particularly animal husbandry.

5.3.2 Landscape and biological diversity

5.3.2.1 Landscape diversity

The main types of landscapes are foothills and mountains. The foothills are particularly heavily influenced by human activities, inhabited and developed for industrial and agricultural purposes. Initially they consisted of plains and forest-plains, mainly on various chernozem soils; today they look like fields, with a few small blocks of forest and strips on the river banks. The mountain landscapes are more diverse, arranged in vertical belts: forest (up to 2,000-2,200 m), mountain meadows (subalpine and alpine meadows, 2,000 to 2,500-2,800 m), sub-nival, and nival.

The mountain climates are extremely diverse, determining the general nature of the vegetation of all the belts. In general, the climate is less humid to the north of the Main Caucasus range, and the climate is generally drier in this region.

5.3.2.2 Floristic diversity

The flora includes 1,280 species, belonging to 462 genera and 108 families, and dominated by angiospermae (1,234 species). There are seven species

Table 5.4 Administrative structure and population of Karatchaevo-Tcherkesskaya Republic

Administrative unit (town, raion)	Area (000 ha)	Population (000)	Towns
Adygei-Khabalsky	53	28.8	none
Zelenchuksky	293	54.2	none
Karatchaevsky	392	25.7	Karatchaevsk Teberda
Malokaratchaevsky	136	37.9	none
Prikubansky	102	34.5	none
UST-Jegutinsky	98	50.1	Ust-Jeguta
Urupsky	278	22.1	None
Khabezsky	66	28.5	None
Karatchaevsk city		33.2	-
Tcherkessk city		123.3	-
Total	**1430**	**438.3**	**4**

(five genera and three families) of gymnospermae. In terms of proportion of species, trees account for 2.4%; shrubs for 6.0%; bushy vines for 0.08%; semi-shrubs for 1.7%; small shrubs for 0.16%; perennial herbs for 75%; biennials for 3.7%; and annuals for 11.0%. A total of 272 species are Caucasus endemics; 23 are included in the Red Book of the Russian Federation and 11 in the USSR Red Book; 145 species are rare for the North Caucasus.

The majority of species are found in the forest belt (900), less in other belts: subalpine (373), alpine (206), sub-nival (122), plains and forest-plains (>186). The types of vegetation are as follows: forest-plains, forests, meadows, subalpine high herbs, dwarf shrubs, wastelands, screes, and highland wetland swamps.

The developed foothills are dominated by rural communities and agro-coenoses; the forest belt by coniferous trees (about 60% of the area): Kokh pine, Caucasus fir, and eastern spruce. Broadleaf species include oak, beech, white beech, ash, maple, birch, aspen, alder, poplar, and willow. The mountain meadows belt is dominated by subalpine reed grass, fescue, and mixed herbs meadows, sometimes with the prevalence of relic Tertiary species. In the

subalpine belt are wasteland meadows, as well as fescue meadows with alpine small herbs, mixed herb alpine meadows, and scree vegetation.

5.3.2.3 Fauna diversity

There are 223 species of vertebrates in the KTR. The 43 mammal species include: sub-species of Caucasus mole, large *Erinaceus, Suncus etruscus* (*Insectivora*); *Rhinolophidae, Myotis, Eptesicus, Pipistrellus, Barbastella* (*droptera*); the predators jackal, bear, weasel, marten, lynx, and Caucasus wild cat; the rodents Caucasus squirrel, Caucasus mouse, polchek, forest and Central Asian mouse, prometeeva, bushy and snow field mouse; and boar, Caucasus deer, Caucasus serna, Caucasus mountain goat, and mountain (formerly extinct Caucasus) bison.

The 170 bird species include 40 endemic species and sub-species. The most popular are *Chelidonium,* Caucasus black grouse, Caucasus mountain turkey; the predators *Gypaetus barbatus,* kanuk, *Accipiter gentilis; Strigiformes* (*Aegolius funereus,* Caucasus *Strix; Dendrocopos major* and *Picus viridis)*; *Passeriformes* (*Pyrrhocorax pyrrhocorax, Corvus alpinus,* mountain *Acanthis, Turdus torquatus* and *Turdus meruld*).

There are six reptile species (three lizards and three snakes), four species of amphibia; three species of fish (stream trout, gudgeon and golets), and about 1,080 species of insects.

5.3.2.4 The system of specially protected natural areas and their development

There are two federal reserves in the KTR. The Teberdinsky state natural biosphere reserve was founded in 1936. It has an area of 85,000 ha, within a protected area of 150,000 ha. The reserve's primary objective is to preserve natural complexes and monitor the processes taking place in the reference mountain systems. The KTR also includes the south-eastern forestry farm of the Caucasus state natural biosphere reserve.

For the purposes of the preservation, reproduction, and rehabilitation of rare and valuable animal species, 260,300 ha of reservations have been established. Protection is provided to the most productive parts of mountain ecosystems. These include the Dautsky federal zoological reservation (74,900 ha), for protection of species; and the following state reservations: Damhurtz (30,000 ha), Tcheremhovsky (36,500 ha), Tchiliksky (35,000 ha), Khasautsky (18,000 ha), Elburgansky (15,000 ha), Labinsky (15,000 ha), Arkhyzsky (35,500 ha), "White Rock" (ornithological, 400 ha). There are also 74 registered nature monuments of republican significance, whose preservation is not efficient.

5.3.3 Human influences on landscape and biological diversity

5.3.3.1 Land use structure

Land uses in the 1,427,600 ha of the Karatchaevo-Tcherkesskaya Republic are as follows:

- agricultural lands: 57.4%;
- human settlements: 2.6%;
- industry and transport: 0.5%;
- specially protected natural areas: 6.8%;
- forests: 27.3%;
- water resources: 0.7%;
- reserved lands: 4.7%.

5.3.3.2 Forests

Forests cover much of the Republic (area defined as forest, 397,100 ha; area covered by forest, 416,200 ha). The area and stock by types of species are as follows:

- coniferous trees (spruce, fir and pine): 105,600 ha, 34.57 million m^3;
- hardwoods: 132,100 ha, 29.26 million m^3;
- softwoods: 133,200 ha, 17.54 million m^3.

Commercial, intermediate and support logging is conducted. In 1998, it is estimated that the forest service logged 76,500 m^3 and processed 12,000 m^3.

5.3.3.3 Agriculture

There are 670,900 ha of agricultural land. They include ploughed fields (167,100 ha: 24.2%), perennial crops (5,600 ha: 0.8%) and fodder fields (498,200 ha: 74.2%, including 361,600 ha of grazing land). Agricultural activities have had considerable negative impacts on land and water resources. Ongoing processes of land degradation include a decrease in the concentration of humus (-0.3% from 1992 to 1998), an expansion in the area of acid soils (19,900 ha of ploughed fields; 50% of natural hay meadows), and an increase in the area of salinized soils. There are fewer activities related to the protection of land from water- and wind-induced erosion, and the planting of forest field-protection strips has been terminated. One result is that water from the Big Stavropolsky channel has flooded 19,000 ha of agricultural land.

The use of mineral fertilizers and toxic chemicals has decreased considerably: by 21% from 1997 to 1998. At the same time, farms in practically all the regions of the Republic store a total of 22.6 tons of unusable toxic chemicals, in violation of storage rules, which poses considerable danger.

Despite the closure of some livestock farms and the reduction in livestock numbers, there is still severe pollution of rivers by farm discharges that contain manure. Of 220 animal farms, 127 are in water protection zones; 175 have no standard manure storage facilities.

5.3.3.4 Recreation and tourism

Recreational and tourist activities in the Republic receive insufficient attention and rich recreational resources remain unused. The existing tourist bases and rest houses are situated in Teberda city, Arhyz and Dombai towns (with two mountain skiing routes). These centres of mountain tourism are extremely popular within the territory of the CIS. The Republic's tourist facilities include seven tourist firms, five large tourist bases, two tourist complexes, two tourist hotels, one boarding house, and an international youth centre.

5.3.3.5 Hunting and fishing

There are 1.36 million ha of hunting grounds, including 400,000 ha of forest. Sport hunting is conducted on 11 hunting farms and three game hunting sites. Game animals include boar, roe deer, fox, marten, hare and certain bird species. Besides these animals, Karatchaevo-Tcherkessia is inhabited by mountain deer, red deer, serna, bear, squirrel, muskrat, mink, wolf, jackal, raccoon, otter, lynx, Caucasus black grouse, mountain turkey, and *Gyps fulvus*. According to annual estimates of wild fauna, populations of game animals have remained stable over the past five years. In the 1998 hunting season, 44 mountain goats, 165 boar, 57 red deer, 52 roe deer, and 14 bears were harvested.

The Republic's water basins have no commercial significance, and fishing is conducted by amateur fishermen.

5.3.3.6 Mineral resources

The main discovered mineral resources include:

- Urupskoe: copper and pyrite;
- Jegutinskoe: cement raw materials;
- Jagnasskoe: lime for sugar production;
- Agurskoe, Aktubinskoe and Jamagatskoe: facing stone;
- Vorotnikovskoe: sand and gravel;
- Jako-Krasnogorskoe: gypsum;
- Tcherkesskoe: thermal water, iodine and bromine;
- Kumskoe: carbonate mineral waters;
- Verhne-Podkumskoe: carbonate mineral waters;

- Teberdinskoe, Dausuzsky site of Zelenchukskoe, Urupsky: fresh underground water.

In 1998 (in % compared to 1994), the volume of mineral resources extraction in the territory of Karatchaevo-Tcherkesskaya Republic was estimated as follows:

- sand and gravel: 187,000 m^3 (45%);
- sand: 110,000 m^3 (121%);
- lime: 1,046,000 tons (95.7%);
- clay: 350,000 tons (93.3%);
- coal: 3,000 tons (6%);
- copper and pyrite: 112,000 tons (47.4%);
- hematite ore (0%);
- andesite rubble: 1,600 m^3 (28.6%);
- technological lime: 368,000 tons (68.3%);
- marble: 9,500 m^3 (166.6%);

In 1994-1998, all the existing enterprises received licenses for solid mineral resources extraction. Extraction losses did not exceed planned losses.

5.3.3.7 Air pollution

In 1998, there were 2,244 registered fixed sources of emission with a total discharge of 12,900 tons. The volume of emissions from mobile sources (mainly road transport) was 44,900 tons. Pollutants included: solid particles (8.8%); sulphurous anhydride (3.1%); carbon monoxide (61.2%); nitrogen oxides (15.6%); hydrocarbons (10.7%); other (0.6%). Overall, 94.4% of pollutants are captured, with the highest proportion in the industrial production of construction materials (96.1%) and the lowest in agriculture (0.3%).

The trend of emissions from 1991 to 1998 was negative, declining by a factor of 3.3 times for fixed sources and 1.6 times for mobile sources. This improvement is related to the decline of economic activity and the reduction of production. Currently, the most polluted raion is Ust-Jegutinsky (74.2% of air pollutant emissions from fixed sources), followed by Tcherkessk city (13.6%) and Karatchaevsky raion (3.6%). The least polluted raions are Zelenchuksky, Malokaratchaevsky and Khabezsky. Air quality monitoring is undertaken by the State committee on Sanitary and Epidemiological Oversight. The concentration of ozone is not monitored.

5.3.3.8 Water pollution

The Republic has 419 large and small rivers draining into the Black and Caspian Seas, the Big Stavropolsky channel, and fresh, mineral and thermal underground waters. The total use of surface and underground sources is 75.84

to 70.01 million m^3 a year. In 1998, 24.3% was used for agricultural needs and irrigation, 38.8% for household and drinking purposes, 36.5% for industrial needs, and 0.4% for other purposes.

Water purification takes place at 29 purification facilities, most of which require reconstruction. The amount of waste waters arriving at purification facilities exceeds the capacity of the available installations by 1.5 - 12 times. In 1998, 77.32 million m^3 of waste water was discharged, all unpurified.

The main pollutants include ammonium nitrogen, nitrites, nitrates (in some rivers their average concentrations exceed maximum permitted concentrations (MPC) by 0.3-12.0 times); oil products (by 5.4 times); iron (by 3.4 times); synthetic detergents (by 1.24 times); and chromium (from 1 to 50 times). The degree of pollution above MPC for the first three groups and iron changed only slightly from 1994 to 1998, oil pollution has become more and more widespread, and general pollution by toxic substances is growing.

Mineral underground waters are used exclusively for medical purposes and, according to survey data, no cases of their pollution have been registered. Their total flow is 2,844 m^3 per day. Water intake is 940 m^3 per day. The industrial flow of thermal waters is 3,100 m^3 per day, of which 915 m^3 per day are utilised.

5.3.4 Natural resources management

Land use planning and natural resources management are conducted by State bodies for management, regulation and control of natural resources of the Republic. The ecological policy of the government is based on: the decree of the head of the KTR administration "On measures for the implementation of the first stage of the "Concept of KTR transition to sustainable development"; "Activities for the improvement of the ecological situation in the KTR in 1996-2005" adopted by the Government of the Republic; and nine targeted integrated programmes approved by the ministries and agencies of the Republic. Due to the lack of financing, the implementation of the Federal targeted programmes entitled "State support of reserves and natural parks (for the period up to 2000)" and "Development of specially protected ecological and recreational region of the RF Caucasus mineral waters" has been temporarily suspended.

Decisions related to the sound use and preservation of natural resources are taken on the basis of ecological monitoring data and the results of supervision and inspection activities. State ecological expertise and licensed activities are conducted.

5.3.5 Cooperation: non-governmental organizations, universities and research institutions

Public nature protection organizations, together with institutions of secondary and higher education, conduct activities in the fields of ecological education and training. These include the promotion of young environmentalists' movement, school forest farms, and ecological competitions of nature museum organizations. The Karatchaevo-Tcherkessky technological institute and the State pedagogical institute hold scientific and methodological conferences involving representatives of public organizations. See also section 5.1.5.1 and Appendix 2 for further details of NGO activities in the region.

5.4 Kabardino-Balkaria

5.4.1 Introduction

Kabardino-Balkaria is situated in the central part of the North Caucasus and has an area of 12,500 sq. km and a population of 783,800 people, of whom 57.6% reside in urban areas. In the north, Kabardino-Balkaria borders Stavropolsky kray; in the east and southeast, North Ossetia-Alania; in the south, Georgia; and in the west, Karatchaevo-Tcherkessia.

The relief in the Republic is highly developed, and extends from the highest mountain in the Caucasus (Elbrus, 5,642 m) to the Kabardinskaya valley and the Terek river valley (lowest altitude 150 m). Only 49% of Kabardino-Balkaria is below 1,000 m, 21% is from 1,000 to 2,000 m, 19% is from 2,000 to 3,000 m, 11% is from 3,000 to 4,000 m, and 1% is above 4,000 m. Over 58% of the Republic has slopes >5° (5-10°: 13%; 10-25°: 28%, >25°: 17%).

Kabardino-Balkaria includes nine administrative raions, seven cities, two territories under the authority of Nalchik and Prohladny cities, and 108 rural administrations. The borders of the administrative raions in the mountain part of the Republic conform to the watersheds of four main rivers: Malka, Baksan, Chegem, and Cherek. To some extent, these borders coincide with the borders of traditional Balkar communities. Rivers cut through the sub-meridional ranges of the Great Caucasus: Main or Watershed (average height 5,000-4,000 m), Side (5,000-3,000 m), Rocky (3,500-1,500 m), Pastbishny (2,000-1,000 m) and Lesisty ranges (<1000 m).

5.4.2 Landscape and biological diversity

5.4.2.1 Landscape diversity

Kabardino-Balkaria has a classic combination of landscapes. The entire altitudinal and zonal range of landscapes is represented in a rather limited area: plains; semi-desert and foothill plains and forest-plains on chernozems; foothills and central mountains with broadleaf forests on mountain-forest brown soils; highland forests, both coniferous and small-leafed deciduous/coniferous forests on mountain-forest brown soils; highland mountain meadows; and nival-glacial (Table 5.5).

Complex geological and geomorphological conditions and long-term human activities have considerably affected this ideal picture. Practically all the plains and forest-plains in the foothill plains have been developed and modified by agricultural activities. There are virgin floodplain landscapes along the Terek and Malka rivers, with meadows, sometimes flooded grass-mixed herbs vegetation with elements of broadleaf forests (oak, elm).

Table 5.5 Kabardino-Balkaria: altitudinal zones and their characteristics

Zone	Population (%)	Dominant land use	Typical landscapes	Rare and valuable landscapes	Typical flora species	Rare and valuable flora species	Typical fauna species	Rare and valuable fauna species
Foothill, plains and meadow-plains (< 500-600m)	80	Cereal production, industry	plains and meadow-plains developed for ploughing	mixed herbs-grassy plains, floodplains, alder forests	Wormwood, typchak, feather grass,	*Papaver bracteatum*, *Primula vorontsovi*	Plains pole cat, *Dipodida*, fox	*Otis tarda*, *Aquila rapax*
Foothill, central mountains with broadlcaf forests and forest-plains (500-1,200/1,400m)	19	Horticulture	separate ranges with beech/white beech and oak forests	oak and beech forests on ridges and in inter-mountain depressions	Caucasus beech, white beech, oak	*Helleborus caucasica*, *Galanthus botkewitschianus*, *Quercus*	weasel, fox, boar, gopher	brown bear, marten
Middle mountain and highlands xerophytic shrubs and small-leafed deciduous / coniferous forests (l,400-2,300m)	1	Animal husbandry	pine-birch forests, juniper berberis plains	pine valley forests	pine, Litvinov's birch, kazak juniper	wild *Rosa*, Nordmann's fir	roe deer, fox, wolf	
High mountain meadows (2,300-3,500m)	no perma-nent settle-ments	Animal husbandry and recreation	subalpine grassy-mixed herbs. Alpine mixed herbs-grassy, sub-nival mixed herbs	subalpine high herbs, rhododendron thickets, alpine tundra volcanic plateau	*Festuca*, *Poa*, sedge, *Gentiana*	*Rhododendron caucasica*, *Pulsatilla*, *Erysimum meiera*, *Saxifraga*	Caucasus bison, chamois	Ibis, Caucasus black grouse, mountain turkey, partridge
High mountains nival (> 3,500m) small-leafed deciduous / coniferous forests, meadows and nival-glacial		Recreation	nival-glacial	dome-volcanic glacial				

From 500-700 m, the "green" belt begins - the landscapes of the foothill ranges which are most suitable for life and agricultural activities, with beech, oak and oak/maple forests on mountain brown soils. This belt includes major human settlements - including the capital of Nalchik - and forms the border between Kabardin and Balkar settlements.

Landscapes of mountain broadleaf forests are interrupted at their upper border by a system of inter-mountain canyons with mountain-plains landscapes. On the upper slopes, these are replaced by mountain meadow-plains, where the main centres of Balkar settlement are located.

Today landscapes with mountain meadows and forests with small-leafed deciduous and coniferous trees are preserved only in the high mountains, starting in the river valleys at 1,400 m and reaching 2,300-2,400 m, mainly on north-facing slopes. Above 2,300 m are mountain meadow landscapes which are divided into subalpine plains (2,300-2,800 m on south-facing slopes), subalpine high herbs (2,400-2,800 m), alpine mixed herbs with grasses (2,800-3,200 m) and sub-nival zones. The snowline is at 3,500-3,700 m; above this are nival-glacial landscapes.

5.4.2.2 Floristic diversity

In the fragments of the plains zone which are not occupied by ploughed fields are wormwood, typchak, and feather grass; grasses include *Bromus, Festuca,* and *Koeleria.* Infrequent plants include *Leucanthemum, Centaurea phrigiisi, Leonurus cardiaca,* and Marshallov's tchabrets. Vast floodplain areas of the lower reaches of the Malka, Baksan, Cherek and Terek are covered with reeds. Endemic species include *Papaver bracteatum* and *Primula vorontsovi.*

The most valuable species in the landscapes of the foothill forest-plains zone are wild fruit trees and shrubs that form groves. *Mespilus, Crataegus,* and *Prunus divaricata* grow on dry southern and southwestern slopes. On northern slopes are *Pyrus caucasica* and *Malus orientalis.* Valuable species in the broadleaf landscapes include beech, Caucasus white beech, and oak together with its rare variety - Georgian oak. In the forests are many unique plants such as *Helleborus caucasica* and *Galanthus botkewitschianus.* The zone of forests with small-leafed deciduous and coniferous trees includes Caucasus pine and Litvinov's birch, with an understorey of *Ribes bibirsteinus* and *Rubus.* On south-facing slopes are species of wild rose. On forest-meadow sites and in subalpine meadows are *Steleropsis caucasica, Campanula bezengicus* and *Pulsatilla* and, at the upper timberline, *Rhododendron caucasica.*

5.4.2.3 Fauna diversity

There are more than 80 species of mammals. Typical landscapes have made it possible to acclimatize dapple deer and Dagestan bison. In the mountain

coniferous forests, the Altai squirrel has become acclimatized, and the foothills zone in the river valleys is inhabited by acclimatized American mink and raccoon.

Valuable rare endemic species include brown bear, wild cat, and marten. Birds registered in the Red Book include Caucasus black grouse, *Otis tarda, Gypaetus barbatus,* and *Aquila rapax.*

5.4.2.4 Protected natural areas and prospects for their development

The Republic includes one reserve, one national park and 12 sanctuaries (Table 5.6). The largest blocks of forest are connected with the broadleaf forest belt of the foothill-low mountain zone, where the majority of sanctuaries are located.

The Kabardino-Balkarsky highlands reserve was established in 1976. More than 60% of its territory is covered by ice, 5% by forest and rhododendron thickets, and 15% by meadows. Highland small-leafed deciduous/coniferous forests, mountain meadows and, particularly, nival-glacial landscapes are protected. The reserve hosts more than 1,000 species of vascular plants, including many endemic, rare and relic species (Radde birch, *Campanula dolomitica, petrokoma gefta, Saxifraga columnaris, S. dinnikii,* and *Steleropsis caucasica*). The animals include Caucasus bison, brown bear, and more than 100 spieces of birds, including Caucasus mountain turkey and partridge.

Prielbrussky national park was established in 1986 to regulate and balance the traditional agricultural land use, active recreational activities and tasks related to nature protection. This park includes the unique volcanic block of Elbrus, with 122.8 sq. km covered by ice. Rare and disappearing plants include *Lilium kesselringianum, Orchis militaris. O. purpurea,* and *Onosma.*

Nature protection should be extended to the landscapes of the inter-mountain depressions: Bylymsky, Verhnechegemsky etc. with well-pronounced xerophytic vegetation. Landscapes of mountain-valley pine forests which are under recreational pressure are in need of special protection (Prielbrusie).

5.4.3 Human influences on landscape and biological diversity

5.4.3.1 Land use structure

The land use structure is characterized by a large proportion of agricultural land. In recent years, the growth of settlements has been quite marked. In accordance with relevant legislative acts in 1991, one tenth of the agricultural land was withdrawn and included in the relocation fund. These areas were used for the organization of farms, horticulture and vegetable cultivation, and as a result the area of household farms in the Republic increased more than 4-fold from 1990 to 1996 (Table 5.7).

Table 5.6 Kabardino-Balkaria's protected natural areas

Protected area	Area (ha)	Protected landscapes
Kabardino-Balkarsky highlands reserve	82,500	Small-leafed deciduous/coniferous mountain forest, mountain meadows, nival-glacial
National park "Prielbrusie"	100,400	Small-leafed deciduous/coniferous mountain forest, mountain-plains, mountain meadows, nival-glacial
Elbrussky sanctuary	79,000	Small-leafed deciduous/coniferous mountain forest, mountain-plains, mountain meadows, nival-glacial
Baksansky sanctuary	60,000	Broadleaf deciduous/coniferous mountain forest, mountain-plains
Verhne-Malkinsky sanctuary	40,000	Small-leafed deciduous/coniferous mountain forest, mountain-meadows
Nizhne-Malkinsky sanctuary	40,000	Small-leafed deciduous/coniferous mountain forest, mountain-meadows-plains
Chegemsky sanctuary	50,000	Broadleaf mountain forest (including Chegem waterfalls)
Karasu sanctuary	19,000	broadleaf mountain forest
Blue lakes sanctuary	18,000	broadleaf mountain forest (including the system of lakes)
Geduko sanctuary	3,800	Meadow plains and floodplains
Ozreksky sanctuary	9,600	Meadow plains and floodplains
Nersko-Alexandrovsky sanctuary	11,700	Meadow plains, plains and floodplains
Ekaterinogradsky sanctuary	4,200	Meadow plains, plains and broadleaf forests
Verhne-Kurpsky sanctuary	5,800	Broadleaf forests

Table 5.7 Land use in Kabardino-Balkaria

Land use category	Area (000 ha)	
	1990	**1996**
Agriculture	776.4	719.9
Human settlements	13.0	64.8
Industry, transport	1.7	8.4
Nature protection (except forests belonging to the Ministry of Forestry)	86.0	81
Forest resources	261	250.1
Waters	3.3	2.9
Reserved lands (rocks, screes, highlands)	95.5	119.8

5.4.3.2 Agriculture

The main agricultural areas of Kabardino-Balkaria are concentrated on the plains, which are almost entirely ploughed. The plains include up to 40% of all agricultural lands of the Republic, as well as 55% of the ploughed fields. The foothills are a zone of intensive land cultivation and animal husbandry, and include about 50% of the agricultural land, as well as 34.1% of the ploughed fields. The mountain zone (Baksansky, Zolsky, Urvansky, Chegemsky, Chereksky and Elbrussky raions) includes about 18,000 ha of ploughed land.

As a result of intensive land cultivation, the plains communities in the plains of the Republic have been practically entirely replaced by agrocoenoses. Extensive use of pastures has led to the degradation of vegetation cover on 46,300 ha. Some mountain meadows are becoming steppized and desertified.

Mass development and the use of land for agriculture have led to the destruction of the sustainability, self-regulation, and balance of natural ecosystems that ensure their long-term productivity. There are 290,600 ha subject to water erosion, including 45,100 ha of ploughed fields, 3,200 ha of perennial crops, 15,500 ha of hay fields, and 98,900 ha of pastures. Soils on 56% of the agricultural land are subject to processes of water and wind-induced erosion, including 221,000 ha (68%) of ploughed fields. In the last 15-17 years, the area of eroded lands more than doubled.

5.4.3.3 Forestry

The area of available forest resources and protective forest strips is 171,500 ha, including 6,200 ha of protective forests, amounting to 16.2% of the Republic's area, as well as 1.8% of forest strips protecting ploughed fields. In accordance with the general scheme of anti-erosion activities, 6,500 ha have been planted with protective forests, including field protective and water regulating strips (1,500 ha); trees on river banks and valleys bottoms (300 ha); trees around ponds and pools (100 ha); and areas which had been deforested or were coverd with other forest plants (4,600 ha).

There are 268,300 ha of state forests, with more than 50 species of trees and shrubs. The main forest-forming trees include beech, oak, white beech, pine, alder, and poplar. The principal species is eastern beech which grows on 73,500 ha and has a stock of 15.1 million m^3 of valuable timber. All the forests are first-category forests, i.e. they can not be used for commercial lumbering since they either perform mainly water protection, conservation, sanitary-hygienic, recreational and medical functions or are forests with special regime of protection (reserves, subalpine zones).

5.4.3.4 Recreation and tourism

Recreational services specialize in medical mud and water treatment, sport tourism and alpinism. There are two recreational regions: the Nalchinsky treatment and excursions region and the Prielbrussky tourist and alpine area.

In the Nalchinsky region, where there is a well-managed infrastructure of hotels, up to 130-140,000 people annually spent their vacations in the early 1990s. Currently, visitation is about 10-30,000 people. In the 1980s, the Prielbrussky region was characterized by an enormous inflow of tourists: up to 3 million a year, including daily excursions from Nalchik, the area of the Caucasus mineral waters. The greatest pressures were experienced by the pine forests, which suffered from both car emissions and the unregulated movement of tourists in the forests. The establishment of the national park could not solve all the problems, since the interests of the local population and traditions of animal husbandry were not considered. Recreational activity is now a sixth of its former level, the number of jobs has been cut, and local residents are forced to engage in agriculture - as a result, the number of sheep has doubled or trebled.

5.4.3.5 Hunting and fishing

There are two forest and hunting farms (Chegemskoe and Nalchinskoe), as well as six hunting farms: Gundelenovskoe, Kurkujinskoe, Gjinalskoe, Verhne-Balkarskoe, Argudanskie dubki, and Sarskoe. The Nalchikskaya forest hunting

farm (162,800 ha) includes a restored population of red deer and acclimatized populations of European bison and dapple deer. In the sanctuaries of the mountain part of the Republic, hunting of chamois and roe deer is unofficially organized for high-level officials (e.g., in the valley of the Adyrsu river, a right affluent of the Baksan river).

5.4.3.6 Industry and transport

The natural environment of Kabardino-Balkaria experiences a rather heavy technogenic load with its river systems being the most affected. None of eight water purification facilities provides adequate purification of industrial and household wastes. In recent years, as a result of declining production, the level of industrial pollution decreased, but the natural complex is not yet protected against emergency discharges of unpurified waste waters.

5.4.3.7 Mineral resources mining

The most important deposits are of tungsten and molybdenum (Tyrnyaus mountain, the Rocky range), as well as of construction materials (brick-roof tile and clay raw materials, sand-gravel mixtures, construction sands, facing stone, carbonates for cement production). The Republic has unique reserves of mineral waters (carbonate, sulphide, silicon, radon and iodine-bromine) with a daily output of 12,000 m^3, but their use is small in scale, limited to the borders of the "Nalchik" resort.

The population of the Republic and economic enterprises are endangered by technogenic wastes (e.g., at the dumping grounds of processing enterprises and tungsten, molybdenum, and tuff pits). Gravel and volcanic ash pits considerably lower the degree of groundwater protection and are sometimes used for household and industrial wastes.

After being inoperational for nearly half a year, the Tyrnyaus tungsten and molybdenum enterprise resumed its industrial activities in August 1994 without adequate preparation of the hydrological facilities for wastewater reception and protection. This led to the discharge of 5,527 tons of suspended substances, 0.1 tons of molybdenum, and 0.07 tons of arsenic into the Baksan river.

5.4.3.8 Military activities

Military activities exert indirect impacts on the environment. According to local residents, wolves frightened by military activities in the south moved from Tchechnia into neighbouring republics and consequently their number in Kabardino-Balkaria increased. As a result, the number of their attacks on cattle became more frequent.

5.4.3.9 Air and water pollution

Road transport is the main source of air pollution, accounting for about 85% of the total emissions. In 1994, 4,395 tons of pollutants were released from 69 industrial enterprises, public utility enterprises, and other sources. The most common pollutants are substances produced in the course of fuel combustion at heat and energy facilities: nitrogen oxides, carbon oxides, and sulphur dioxide. Industrial enterprises release mainly non-organic dust (from the production of construction materials) and, to a lesser extent, sawdust. However, as there are no large oil production and processing industries in the Republic, its air can be viewed as relatively clean and free of the most dangerous substances.

5.4.4 Institutions and activities for natural resources management

5.4.4.1 State planning

In 1995, a free economic zone (FEZ) was established in Kabardino-Balkaria. Its economy should be based upon non-ferrous metallurgy, gold mining and oil extraction industries, energy, and recreational activities. The peculiarity of the FEZ lies in the need to combine and link non-ecological industries with branches of recreational industry. In accordance with the programme of economic stabilization and development, Kabardino-Balkaria will proceed with non-ferrous metallurgy modernization.

Special state programmes include the programme for the development of Prielbrusie as a resort of international, federal and republican significance.

5.4.4.2 State and administrative control

State and administrative control is exercised on four main levels:

- all-Russian (from Moscow) with transfer of certain powers (data collection and processing) to subregional North Caucasus structures with the centre in Rostov-na-Donu, Krasnodar, and other cities;
- republican (Nalchik);
- raion;
- urban and rural councils.

The Ministry of Forestry, which monitors and regulates the activities of forest farms from Moscow, continues to play an important role in nature conservation. The role of Republican authorities is especially strong in agriculture where they regulate the distribution of agricultural machinery, seeds, fertilizers, etc.

The role of raions is relatively low: residents prefer to solve the most complicated issues directly in Nalchik. Recently, village councils have played

an increasing role in controlling the quality of nature protection. The functions of these councils have recently become close to the functions of traditional rural communities. However, the initiative of local residents is still inadequate, and the role of local population in nature protection remains low.

5.4.4.3 Non-governmental organizations

The main directions of the activities of ecological organizations are the dissemination of information, ecological education and ecological training (Appendix 2).

5.4.4.4 Cooperation, projects

Kabardino-Balkarskaya Republic has always been a model region for conducting research in mountain areas. In the 1980s, many researchers from different countries worked within the framework of a Council for Mutual Economic Assistance (CMEA) project on forecasting the Republic's social, economic and ecological development. Today these activities continue within the framework of the Institute of Geography of the Russian Academy of Sciences (RAS) and the division of geography of the RAS Kabardino-Balkarsky Research Centre (KBRC). The most important topic is entitled "Model of sound use of nature in inter-mountain depressions".

Mountain ecology and natural hazards are studied at the Mountain Geo-Physical Institute in Nalchik. The study of the zoological component of highland ecosystems is undertaken by the Institute of Mountain Territories Ecology of the KBRC. Within the framework of a geographic information system (GIS) of Kabardino-Balkaria at the Institute of Informatics and Regional Development Problems, an ecological atlas of the Republic has been prepared. This shows the main sources and areas of pollution and other ecological processes.

The Moscow State University geographical faculty has a research station in Azau, where it conducts regular cartographic monitoring of air quality processes and phenomena in Prielbrusie. In 1992, a comprehensive atlas of the National Park "Prielbrusie" was prepared. Regular survey of the state of mountain forests is conducted by the Forest Engineering Institute in Voronezh.

5.5 North Ossetia-Alania

5.5.1 Introduction

North Ossetia-Alania is situated in the eastern part of the Northern Caucasus. Its area is about 8,000 sq. km, of which mountains and foothills account for 52% (Table 5.8). The greatest north-south distance across the Republic is 130 km; 122 km west-east. The population is 662,700 (Table 5.9).

Table 5.8 Area of North Ossetia-Alania by altitudinal zone

Altitude zones	Altitude	Area	
		sq. km	%
Plains	below 500 m	2,998	37.6
Low mountains	500- 1,000 m	1,845	23.2
Middle mountains	1,000 -2,000 m	1,453	18.2
High mountains	over 2,000 m	1,674	21.0

Table 5.9 Population of North Ossetia-Alania by administrative unit

Raion	Population as of January 1,1999 (000)	Area (sq. km)
Alagirsky	40.1	2,024
Ardonsky	26.4	377
Digorsky	21.0	593
Irafsky	15.6	1,365
Kirovsky	25.6	407
Mozdoksky	82.6	1,071
Pravoberezhny	55.0	442
Prigorodny	73.7	1,430
Vladikavkaz	322.7	291

5.5.2 Landscape and biological diversity

5.5.2.1 Landscape diversity

Although North Ossetia-Alania is relatively small in area, due to its peculiar relief it is distinguished by rich diversity of natural landscapes, from plains in the north to high mountains in south. The plains of the Northern Pre-Caucasus (Mozdoksky plains), on the left bank of Terek river at altitudes of 120-130 m, are the most populated and developed part. All of the Mozdoksky plains are ploughed and developed for agriculture with such cereals as wheat, corn, sunflower, barley and rye. Considerable areas are occupied by gardens, vineyards, vegetables, and fodder herbs. Along the Terek river valley, narrow strips of floodplain forests remain, with small islands of nut, willow, and oak forests growing on alluvial soils.

To the south of Mozdoksky plains are the low mountain landscapes of the Tersky and Sunjensky ranges. The slopes of these ranges and their foothills are covered with mixed herbs, on low-productivity carbonate and chernozem soils; these regions are characterized by greater rainfall than the Mozdoksky plains. The Sunjensky range is covered with beech, white beech and oak forests, and is characterized by a high diversity of shrubs on turf and podzolized soils.

Further south are the North Ossetian (Ossetian) sloping plains. These are the most populated part of the Republic, with multi-sectoral industrial production, agriculture, a dense network of roads and railways, and an electricity supply network as well as many towns and villages. In the northern part of these plains are Zmeisky and Sunjensky ranges with the narrow gorge of the Terek, Elkhothskie Gates. In the southern part of these plains are the foothills of the Great Caucasus (700-750 m). Here there are many artificial water basins: irrigation channels, ponds and lakes built with the aim of intensifying agriculture, recreational activities, and commercial fish cultivation.

Further south, the mountains begin with the Lesisty (forested) range with flat northern slopes and steeper southern slopes in the direction of the Great Caucasus highlands. The highest peaks of the Lesisty range are Lysaia (bald) mountain (1,037 m), Tarskaia (1,240 m) and Ruhsdzuar (1,170 m). The slopes of this range are covered with thick forests, distinguished by a high diversity of wild fruit trees (sweet cherry, pea, apple) and many shrubs. The meadows have many species of mixed herbs. In the upper parts of the range are rich pastures. The slopes below are covered with deciduous forests which are of significance for water protection and nature conservation.

To the south of the Pastbishny (pasture) range is the Rocky range, consisting of Upper Jurassic limestones and dolomites. The slopes are covered with forests up to 2,200-2,400 m; above are subalpine and alpine meadows. The Pastbishny and Rocky ranges are characterized by karst formations, with some freshwater springs which are connected by pipelines to various settlements.

Between the Rocky range in the north and the Bokovoi (Side) range in the south is a system of inter-mountain depressions with a dry climate, known by local people as "Sunny valley". It is characterized by xerophytic vegetation on mountain-plains soils. The climate of this valley is cool: annual precipitation is 380-420 mm and there are up to 250-260 sunny days a year. All the inter-mountain depressions between the Rocky range and the Side range have been inhabited by people since ancient times, and therefore one can easily see previously cultivated plots of land on the surrounding mountain slopes, with assemblies of rocks and terraces. Currently, many such plots of formerly cultivated land are either neglected because many people who used to live in the mountains have migrated to the plains or, at best, have been turned into hayfields or pastures.

To the south of the Rocky range are the Side and Watershed ranges. This is a region of permanent snow and glaciers: the highest altitude zone, with the least number of inhabitants and economic facilities. In the southwest are the "Digorskie Alps" with the highest peaks: Gulchan (4,474 m), Cugan (4,489 m) and Doppakh (4,400 m). The glaciers that cover these mountains feed the main river of this region, Urukh, as well as its numerous affluents. The Watershed range divides the northern and the southern macro-slopes of the Caucasus, and is crossed by a number of passes - Mamisonsky, Zekarsky, Dzedo, Kutkh, Sbaisky, and Roksky - which connect the Northern Caucasus and Transcaucasus.

On the slopes of the Side and Watershed ranges is a vast nival-glacier zone: more than 300 sq. km, with 100 glaciers. The main centre of glaciers is Kazbeko-Djimaraisky, with eight large glaciers. The largest glacier of this block is Mailiisky, with a glaciated area of 25 sq. km and a length of 7 km. Another major centre of glaciation is Digorsky, in the west of the Republic. The most accessible glaciers are Tseisky, Karaugomsky, Mailiisky, Skazsky and others situated 5-7 km from settlements and tourist and alpinist centres. Glaciers represent an important source of environmentally safe water.

5.5.2.2 Floristic diversity

The most diverse vegetation is found in sub-nival alpine and subalpine belts. Sub-nival vegetation is typically on rocks and screes. Since the soil layer is undeveloped, most plants are moss and lichen, with a number of flowers, of which the most common are *Saxifraga, Alopecurus, Veronica, Campanula,* and *Alchemilla.*

Alpine vegetation is found at lower altitudes and consists of alpine meadows, alpine carpets, and rock and scree vegetation. Typical species of alpine meadows are *Poa alpina, Nardus stricta, Kobresia,* and *Sibbaldia.* The most common species in Alpine carpets include *Oryas caucasicum,*

Campanula, and *Taraxacum.* In the rocks and screes, *Saxifraga, Alchemilla, Draba,* and *Campanula* are common.

The vegetation of the next, subalpine, belt is more diverse. It includes subalpine meadows, subalpine high herbs, thickets of dwarf shrubs, and subalpine elfin woodland. Subalpine meadows are usually represented by herbs with a height of 50-100 cm. This belt is characterized by rich diversity of species such as *Festuca, Poa alpina, Bromus, Anthoxanthum, Trifolium, Vicia alpinus,* and *Koeleria.* These meadows are not used as pastures since many of species are not palatable for domestic animals. Communities of subalpine high herbs are distinguished by thick grassy vegetation sometimes reaching two meters in height. The high plants form a canopy under which shadow-loving plants grow. The most typical include *Heracleum sosnovskii, Senecio, Symphytum,* and *Aconitum.* Thickets of dwarf shrubs include *Rhododendron caucasicum,* willow, mountain ash, mountain blackberry and cranberry, and juniper. They prevent soil and slope erosion. Subalpine elfin woodland consists of trees and shrubs of medium height with curved trunks caused by large amounts of snow, which influence the entire forest cover. The main species are birch, willow, maple, beech, and pine.

The forest zone is located in the central mountains and lowlands, as well as the floodplains of the Terek river and its affluents. Large areas previously covered by forests have been completely logged; their stock decreased most rapidly from the mid-19th century - the period of mining development. Today, 216,000 ha are covered by forests (22.3% of the Republic's area). In this respect, the Republic is in a more favourable situation than other entities of the Northern Caucasus. The main forest-forming species include beech (96,000 ha), white beech (13,100 ha), oak (7,600 ha), pine (7,000 ha), and other deciduous species (17,900 ha).

The mountain-forest zone is covered by pine and birch forests which are mainly found in depressions on low-productivity rocky soils. Broadleaf forests grow on the northern slopes of the Rocky, Pastbishny, and Lesisty ranges of the Great Caucasus and the slopes of the Sunjensky range. The main forest-forming species include beech, white beech, and oak, as well as various shrubs. There are also many wild fruit trees, including such common species as hazelnut, apple, pea, cherry plum, sweet cherry, as well as raspberry, blackberry, strawberry, mountain blackberry and cranberry.

In the inter-mountain depressions, the vegetation is generally of a highland-xerophytic type. The most typical species are *Astragalus marchalus, Artemisia, Gypaetus barbatus, Salvia,Juniperus sabina,* and chebrets.

The vegetation of the forest-plains zone, which occupies the foothills of Ossetia's sloping plains, consists of trees, shrubs and numerous herbs. Trees include ash, white beech, oak, maple, linden, and wild fruit trees. There are also hops, herbs *(Viola, Primula, Urigani, Hypercum, Tanacetum, Achillea,*

Plantago), and shrubs (hawthorn, Cornelian cherry, blackthorn, *Euonymus*, hazelnut).

The plains zone is fully developed for agricultural purposes and unploughed fields are rare. On the majority of unploughed fields, mixed herbs-fescue-feather grass communities are typical; in river floodplains there are narrow strips of deciduous forests dominated by willow, maple, aspen, and oak as well as sea buckthorn and some wild fruit trees.

5.5.2.3 Fauna diversity

The fauna diversity is linked to the floristic diversity, climate, and relief, as well as human economic activities.

In the sub-nival and alpine belts are many birds which mainly nest in large groups or colonies and stay in flocks. Most species have just one brood, and there is enough food for them in the snow-free season. Large animals in this belt include mountain goats, which keep in herds on steep rocky slopes. In the daytime, mountain goats hide among inaccessible rocks in the highlands, while at night they descend to alpine meadows in search of food.

In the zone of subalpine meadows are *Microtinae, Sicista caucasica,* and hare. Game animals include mountain goat, chamois, boar, fox, *Martes fonia,* and wolf. Birds include *Anthus, Pyrrhospiza, Alauda, Coturnix coturnix, Silvia communis, Apodes, Tichodroma muraria,* and Caucasus black grouse. Predatory birds include *Aquila chrysaetos, Falco peregrinus, Gypaetus barbatus,* and *Gypsfulvus* registered in the Red Book of North Ossetia.

The mountain-forest zone fauna includes *Martes fonia, Musteria nivalis, Dryomys,* brown bear, boar, roe deer, fox, and wolf. The bird community is also much more diverse and includes *Spinus soinus, Pyrrhula pyrrhula, Turdus viscivorus, Parus, Phylloscopus caucasica,* and *Loxia curvirostra.* Predatory birds include *Accipiter nisus, A. gentilis, Milvus, Strix,* and *Asio otus.*

The fauna of the dry plains of the inter-mountain depressions is highly diverse, especially the rodents. There are also hare, marten, fox, and weasel. The bird community includes *Alauda arvensis, Passer, Columba, Streptopelia, Merops apiaster, Turdus, Alectoric kakelik, Sittidae neumayer,* and *Anthus.*

The fauna of forest-plains and plains zone has been greatly modified as a result of human economic activities, especially agriculture. Agricultural activity contributes to the diversity of rodents. The plains are inhabited by *Acantholimon,* hare, gopher, hamster, fox, and jackal and are characterized by a high diversity of ornithofauna typical of the plains zone, including *Otis tarda, Passer, Coturnix coturnix, Alauda,* and *Aquila rapax.*

5.5.2.4 Specially protected natural areas and the prospects for their development

The protected areas include sanctuaries, reserves, hunting farms and national parks which comprise about 24% of the area of the Republic.

Sanctuaries have been established in North Ossetia since 1958. The first was Tseisky, with an area of 28,900 ha, of which 14,500 ha are forested and 900 ha are fields and wetlands. The main protected species are Caucasus bison, Caucasus red deer, chamois, roe deer, boar, bear, lynx, marten, and Caucasus black grouse. In 1967, two more sanctuaries were set up - Zamankulsky in Pravoberezhny raion and Turmonsky in Digorsky raion - with a total area of 19,600 ha to protect boar, hare, pheasant, bear, roe deer, and other species. In 1970, yet another two sanctuaries were created - Makhchessky in Irafsky raion and Saursky in Digorsky raion - with a total area of 35,300 ha. Other sanctuaries established subsequently include Zaramagsky in Alagirsky raion, Zmeisko-Nikolaevsky in Digorsky and Kirovsky raions, and Vakhchessky and Maputonsky in Irafsky raion. Thus by 1980, there were eight sanctuaries, with a total area of 141,800 ha.

The North Ossetian state reserve was set up in 1967. It is 26,000 ha in area, with a protected area of 42,000 ha. The reserve is located at altitudes from 1,300 to 4,700 m in Alagirsky raion. Of about 6,000 species of plants that grow in the reserve, 2,000 are Caucasian endemics, including over 80 species of shrubs and trees.

The North Ossetian state hunting farm was established for protecting and increasing the numbers of game animals by the decision of former Council of Ministers of the RSFSR and North Ossetia. The farm occupies more than 240,000 ha and is situated in the southwestern part of the Republic.

The North Ossetian national park was established by the decision of the Russian Government on November 2, 1998. It includes 55,000 ha in the westernmost part of the Republic, in Irafsky raion, along the Urukh river and its affluents.

5.5.3 Human influences on landscape and biological diversity

5.5.3.1 Land use structure

A total of 344,300 ha are intended for agricultural land use, including 48% used as ploughed field and 20.5% as grazing land, including mountain pastures. There are 100,487 ha (1996 data) of agricultural land in the mountain zone, including 92,435 ha used as pastures, 7,863 ha as hay fields, and 162 ha as ploughed fields. More than 61% of this land is at altitudes over 2,400 m, and 39% from 900 to 2400 m. Over 90% of all grazing land and hay fields is on

land with slope angles of more than 15°. Over the last 50 years, the agricultural lands of the mountain zone decreased by 20-30%. According to data supplied by the Ministry of Environment and Natural Resources Protection of North Ossetia-Alania, the state of mountain pastures is critical. The projected vegetation cover is 10-50% lower than the normal level while the "green mass" productivity has declined to 5-30% of the norm.

5.5.3.2 Agriculture

Agriculture is considered a priority economic activity. The bulk of the agricultural output is produced by collective and state farms, although in recent years the output of farms and private enterprises has considerably increased. Agriculture is a multi-sectoral industry. The agricultural sector specializes in cereal cultivation: winter wheat, corn, rye, barley and oats. Considerable areas are occupied by potatoes, vegetables, technical crops, fruits and grapes, and there are also berry bushes. The main fields of animal husbandry include cattle, sheep and pig breeding, poultry breeding, and bee-keeping.

There are five distinct agricultural zones. The first zone is Mozdoksky plains zone, where the main crops are wheat, corn, coriander, fruit, grapes, vegetables, and squash. In the second zone (Kirovsky and Pravoberezhny raions), corn, cereals, and hemp are grown, and meat and dairy cattle are produced. The third zone includes Ardonsky and parts of Digorsky and Prigorodny raions; the main crops are vegetables, corn, cereals, and technical crops. The fourth zone (Alagirsky and parts of Digorsky and Irafsky raions) specializes in vegetables, fruit, potatoes, and corn. The fifth zone includes the mountains of Irafsky, Alagirsky and Prigorodny raions. The main crops are fodder crops and berries, with animal husbandry on natural fodder.

The peculiarities of modern agriculture include the following factors: reduction of animal husbandry output in the state sector with simultaneous growth of this output in the private sector and on farms; and expansion of the farm network, with 1,107 farms which occupy only 3% of the total ploughed area and produce about 8% of the total output. Both the use of chemicals and the area of cultivated irrigated land have been dramatically reduced.

5.5.3.3 Forestry

North Ossetia's forests grow in four natural zones: the plains and floodplains, the Kabardino-Sunjensky range, the mountains, and the high mountains. The forests cover 216,000 ha (22.4% of the Republic) and have always been subject to intensive logging by the local population to meet their needs for fuel, construction, and other economic purposes without due regard to their natural growth and nature protection functions. The forested area has especially decreased since the 19th century due to the establishment of mining enterprises.

Consequently, North Ossetia's forests were designated as protective (first group) forests by the RSFSR Council of Ministers. This contributed to a drastic reduction in the volume of logged timber. The scale of timber logging increased considerably in the post-war period and reached 600,000 m^3 a year in mid-1950s. In recent decades, the volume of logging has decreased, and is now no more than 40-50,000 m^3 a year (sanitary and service cuttings).

The process of forest rehabilitation began 1950, and has resulted in the expansion of the area occupied by valuable species such as chestnut, walnut, oak, sweet cherry, ash, and maple. Since the 1960s, at least 1,500 ha of forests have been rehabilitated each year, and they continue to expand.

The Committee on Forestry of the Republic provides guidance for an arboretum and four forestry farms, as well as forest ranger posts in Alagir, Suadag, Digor, Elkhotovo, Mozdok and Oktiabrsky.

5.5.3.4 Recreation and tourism

The first information on the health resort resources of North Ossetia was contained in the works of the famous Georgian geographer and historian young tzar Vakhushti who, when describing Ossetia's natural resources, noted the abundance of mineral waters. The first mountain health resort was established in the mid-19th century (1847) at 2,300 m, using mineral waters from Upper Karmadon. Today a modern sanatorium is located in the same place. The second health resort was established at the end of the 19th century near Alagir village near the Voenno (military)-Ossetinskaya road in Tamissk settlement.

North Ossetia was considered a major recreational area in the former USSR with regard to both the number and capacity of recreational facilities. By the late 1980s, the capacity of recreational institutions was 2,900 places in health resort institutions; 5,200 places in tourist-excursion facilities; 950 places in alpinists' camps and mountain skiing bases; 4,100 places in pioneer camps; and 3,200 places in the recreational zones of industrial enterprises, ministries and agencies. In 1998, the capacities were as follows: 2,100 places in health resort institutions; 3,400 places in tourist-excursion facilities; 300 places in alpinists' camps and mountain skiing bases; 900 places in pioneer camps; 1,200 places in recreational zones of industrial enterprises and agencies. As a result of military conflicts in the Northern Caucasus, most recreational institutions have been closed or are being repaired.

5.5.3.5 Hunting and fishing

According to data supplied by the Section on Wild Life Protection of the Nature Protection Society, there are 607,600 ha of hunting grounds. The annual cost of managing hunting and specially protected areas is 2,628,000 rubles including 1,462,000 rubles from the state budget. The annual costs of wild life

protection and reproduction are up to 2,000,000 rubles and 371,000 rubles for biological activities.

In 1998, 279,500 rubles were allocated for wild life protection and reproduction from the Republican Environmental Fund of the Ministry of Nature of the Republic. Hunting managers established 107 sites for animal feeding, where 343 tons of cereals and cereal wastes were stocked for winter feeding; and improved 307 solonetz in the mountain-forest zone. The need for such a significant amount of fodder for feeding wild animals is dictated by the large-scale logging of beech whose seeds served as fodder for wild animals.

Functions relating to the protection of wild animals and their habitat are performed by about 400 permanent state inspectors, hunting managers, forest rangers and a large group of voluntary watchmen. As of January 1, 1999 the following numbers of wild animals were registered: 442 deer, 62 Caucasus bison, 2,900 mountain goat, 1,407 boar, 970 roe deer, 193 bear, 200 hare, 520 marten, 600 fox, 180 jackal, 80 wolves, and 700 chamois.

According to data supplied by the Section of Fish Resources Protection, in 1997-1998, the following numbers of young fish were released into water bodies: 82,300 salmon, 106,000 trout. According to early 1999 data, the annual volume of harvested fish in the Republic's fish farms was 40 tons, while in certain years it reached 200 tons. The Government pursues a policy of developing the network of fish farms, with the aim of harvesting of about 4,500-5,500 tons of different fish species in 2000. Despite positive activities on fish resources protection, there were several cases of the disposal of inadequately purified waste waters into the Republic's largest river, the Terek.

5.5.3.6 Industry and transport

North Ossetia is one of the industrially developed entities of the Northern Caucasus. Historically, the non-ferrous metals mining industry has been particularly developed. The modern industrial structure consists of manufacturing and engineering, non-ferrous metallurgy, multi-sectoral food industry, light industry, forestry, logging and chemical industry, construction materials, and glassware production.

The main industrial facilities are situated in the capital of the Republic, Vladikavkaz, as well as in raion centres such as Baslan, Mozdok, and Alagir. In the mountains are mines for polymetallic ores and the extraction of non-ore raw materials for road, construction and chemical complexes and agriculture. The large enterprises "Electrozink" and "Pobedit" remain the largest suppliers of non-ferrous metals and solid alloys not only for use in Russia, but also for export to foreign countries.

The Republic possesses a well-developed complex of food and liqueur enterprises whose output is exported to about 60 entities of Russia and some foreign countries.

North Ossetia has a highly developed transport infrastructure. The road density is 289 km per thousand sq. km (the average in Russia is 26 km per thousand sq. km). The Republic is crossed by the Voenno-Gruzinskaia road (Vladikavkaz - Tbilisi) and the highway from Rostov to Baku (Azerbaijan). Since the 1980s, a year-round Transcaucasus highway has been operational, with a 3.6 km tunnel crossing Rocksky pass, which connects Russia with the Transcaucasus states. There are 2,840 km of highways and all the raions are connected by a network of asphalted roads. The mountainous part of the Republic has a network of paved roads. Railway communication with Russia was established as early as 1875, and there are currently 165 km of railways in the Republic.

5.5.3.7 Mineral resources mining

The most important of the vast variety of mineral resources are polymetallic ores which have been developed and actively used since 1853, when lead, zinc, and silver were extracted from these ores for the first time. They provide raw materials for "Electrozink" - one of the largest non-ferrous metallurgic enterprises operational in the Republic. Today, polymetallic ores are intensively developed and extracted from the Djimidonsky deposit; other deposits provide small volumes of concentrate for "Electrozink", which mainly uses imported raw materials.

5.5.3.8 Air and water pollution

According to early 1999 data, there are 1,103 enterprises and organizations in the Republic. The total volume of emissions into the air from vehicles and fixed sources is 116,036 tons a year. In recent years, air emissions from fixed sources have decreased considerably. This is related to the decline of production of industrial enterprises, Current emissions are 13,060 tons, including 2,170 tons of solid waste and 20,890 tons of gases, containing 1,121 tons of nitrogen dioxide, 2,850 tons of sulphurous anhydride, 5,926 tons of carbon monoxide, 117 tons of hydrocarbons, and 401 tons of volatile organic compounds. The share of road transport in the total volume of air emissions is 88.75% of the total: 102,972 tons. The most complicated ecological situation in respect of air pollution is in the capital of the Republic, Vladikavkaz, where more than 70% of industrial enterprises and means of transportation are located.

The annual water intake is 1,322.3 million m^3, including 1,172.3 million m^3 from surface waters and 150.0 million m^3 from underground waters. The principal sources of waste disposal into water are the "Electrozink" plant, fodder yeast plant, and alcohol production plant. Wastes also are disposed into

water as a result of damage to water purification facilities in Vladikavkaz, Baslan, Mozdok and Alagir.

5.5.4 Framework for the management of natural resources

5.5.4.1 Land use planning

The emergence of new forms of ownership in the form of farms, fanners' associations, and stock companies has considerably accentuated the issues related to land use. However, many problems remain unresolved, which reduces the efficiency of land use. The fact that, by early 1999, 56,300 ha (13.9% of the total area of agricultural land) were occupied by farms shows that new land owners have emerged who achieve much better economic performance. According to early 1999 data, the residents of the Republic owned 21,200 ha, including 12,900 ha of ploughed fields. The area of collective gardens increased by 1,300 ha and is currently 15,700 ha. About 1,100 ha have been allotted for individual construction.

5.5.4.2 State organizations

The Republic includes eight rural raions and four districts within the capital of Vladikavkaz. Each raion is headed by a head of administration.

There are several state higher educational institutions: K.L. Khetagurov North Ossetian state university, the Northern Caucasus State Technological University, the Mountain State Agrarian University, and the North Ossetian State Medical Academy, as well as eight private commercial higher educational institutions, many of which have not yet been certified and accredited. In addition, a North Ossetian Research Centre and a public North Ossetian Association of Scientists have been operational since 1994.

In the fields of staff training and research activities, the Republic's higher educational institutions are connected primarily with higher educational institutions of Moscow, St. Petersburg, Rostov-on-Don, Krasnodar, Stavropol, Voronezh, Kursk, etc.

5.5.4.3 Non-governmental organizations

There are 3 Republican newspapers - "North Ossetia", "Rastdzinad" and "Slovo" - and more than a dozen newspapers are functioning in the Republic which, in the perestroyka period, were partially closed due to lack of demand. In addition there is local TV and radio; besides, several Republican magazines are published, such as "Darial", "Iraf", and "Nogdzau".

The issues of ecological culture and ecological advocacy are addressed not only by mass media but also by many libraries, clubs, and cultural centres. In this work, a major role belongs to educational institutions: higher educational institutes, vocational training schools, general education schools, informal schools, and kindergartens. The results of ecological advocacy and education activities each year (so far, for five successive years) are the subject of a competition called "For children and grandchildren" in which all educational institutions take part. Up to 500-600 delegates participate in the final meeting held in Vladikavkaz.

Ecology and nature protection are key issues for legislative bodies, as manifest in the adoption on April 27, 1988 of the Law of the Republic of North Ossetia-Alania "On the Protection of Natural Environment" as well as the "Mountain Law" (1998), and the Regulations of the Government of the Republic "On Tourism", "On the Use of Sub-Soils in the Republic of North Ossetia-Alania", "On Natural Health Resources, Health and Recreational Resorts" and "On Industrial and Commercial Wastes", all of which are connected with environmental issues.

Public environmental monitoring is conducted by many public organizations among which the most active are the Republican Association "Ardz", the North Ossetian affiliate of the International Association of Agrochemists and Agroecologists, the North Ossetian affiliate of the International Academy of Ecology and Human Safety, and the Foundation in Support of Environment Protection (Appendix 2).

5.5.5 Inter-state and regional cooperation

Being an entity of the Russian Federation, the Republic addresses ecological, trade, economic and cultural issues in close cooperation, first and foremost, with the neighbouring entities of the Northern Caucasus economic region. The Republic has negotiated bilateral agreements on cooperation with all of them.

Cooperation with foreign countries was manifested in the opening in K.L. Khetagurov North Ossetian state university of a UNESCO department which, on May 26-29, 1996, held an international conference on the topic: "Mass media and ecological education in addressing the problem of environmental protection". The Conference was attended by more than 400 scientists. Of particular note in the scientific life of the Republic and Russia have been three international conferences concerning mountain territories, organized in 1992, 1996, and 1998 by the Republican Ministry of Nature Protection.

5.6 Ingushetia

5.6.1 Introduction

Ingushskaia Republic is the smallest republic in the North Caucasus and Russia as a whole, in terms of both population (308,700 people) and area (2,800 sq. km). Its borders with Tchechnia are yet to be marked and are currently set along the borders of former administrative raions of the former Tchecheno-Ingushskaya ASSR: Malgobeksky (northern foothill raion); Sunjensky (the largest raion covering foothills and mountains); and Nazranovsky (the capital raion). This consists of two parts: the foothill and mountains, separated from each other by Sunjensky raion. Besides Tchechnia, Ingushetia has common borders with Georgia and North Ossetia.

In the south, the Republic is separated by the mountains of the Side range (highest peak, Shan, 4,451 m) and, in the north, by the mountains of the Tersky forward range (maximum altitude 701 m). Over 91% of the Republic's population reside in the foothills and foothill-plains zones.

Ingushetia's geographic position in the zones of military conflicts, with its territory stretching from highlands to foothills, and the lack of traditional research and educational personnel (as compared to other republics) necessitate specific requirements for the organization of nature protection.

5.6.2 Landscape and biological diversity

5.6.2.1 Landscape diversity

Ingushetia's landscapes are extremely diverse: within its area, similar in shape to a transect of 100 x 30 km, there are seven types of landscapes: from plains (altitude 200 m) on the plains/foothills to nival-glacial (over 3,500 m) (Table 5.10).

The lowest landscapes are secondary mixed grass and meadows plains in the Sunja river valley. To the south and north, landscapes change depending on the altitude. In the north, along the Sunjensky and Tersky ranges, are plains landscapes of forward ranges with fragments of oak, maple and *karagatch* (*Ulmus foliacea*) forests in ravines on luvic chernozems. At higher altitudes, they are replaced by forest-plains landscapes on carbonate chernozems. Between the Sunjensky and Tersky ranges, in the Alhanchurskaya valley, are plains with mixed herbs-grass landscapes on carbonate chernozems.

To the south of Sunja river valley are foothill and forest-plains landscapes. Above 350 m, they are replaced by forest landscapes on mountain brown,

Table 5.10. Ingushetia's Landscape and Biological Diversity

Zone	Population (%)	Dominant land use	Typical landscapes	Rare and valuable landscapes	Typical flora species	Rare and valuable flora species	Typical fauna species	Rare and valuable fauna species
Foothill, plains and forest-plains	98	horticulture, industry	plains and forward ranges hills-foothills with plains and forest-plains landscapes	birch forests, meadow plains on chernozems	*Festuca*, typchak, *Rosa spinossima*	Oak,*Amygdalus nana*,*Papaver bractealum*	fox, jackal, pole cat, gopher, hamster	marten
Low and middle mountain forest (350 to 1,800m)	2	mountain land cultivation and animal husbandry	oak forests, beech/white beech forests and forest-meadows landscapes	xerophytic landscapes of intermountain depressions, linden valley forests	Caucasus beech, pear, highland maple, white beech	Linden, ash	boar, lynx, bison (acclimatized)	brown bear, roe deer
High mountains (over 1,800-2,500m) small-leafed deciduous/ coniferous forests, meadows and nival-glacial		animal husbandry	subalpine and alpine grassy-high herbs, nival-glacial (from 3,400 m)	birch-pine valley forests	*Festuca*, *Bromus*, sedge, matgrass	Caucasus rhododendron, perennial pea		Dagestan mountain goat

sometimes podzolized soils in combination with humus carbonate and meadow alluvial soils. The forests are divided into low mountain oak, middle-mountain beech/white beech, and maple forests (rarely, on the Rocky range). Above the middle-mountains beech/white beech and maple forests on the Rocky range are subalpine meadows (from 1,800 m).

To the south of the Rocky range are unique dry intermountain-depression landscapes. The peculiarity of their climate, with a frequent drying effect (in the Assa river valley), has facilitated the formation of a special range of micro-zones in the depression, in concentric circles: at the bottom, semi-desert wormwood landscapes; then mountain-plains shrub landscapes on the slopes.

In the valleys to the south of the intermountain-depression are sparse birch forests and, less frequently, linden forests on mountain-forest podzolized soils. From 2,500 m, they are replaced by mountain-meadows landscape belts: subalpine, alpine, and sub-nival. Nival-glacial landscapes are widespread on the Side range along the border with Georgia.

5.6.2.2 Floristic diversity

On a comparatively small area stretching across the entire range of altitude zones, there are many typical representatives of the Northern Caucasus flora. Particularly notable among the rare plants and vegetation communities are the linden highland forests in the Assa and Armha river valleys, with Caucasus blackberry, *Ostrya*, and yew. Eastern beech, ceilamic primula, Ann's urinia, and *Campanula osetinis* are frequent.

5.6.2.3 Fauna diversity

Like the flora, the Republic's fauna is rich in practically all the representatives of zonal landscapes: shrew, weasel, and marten in the plains zone; jackal, pole cat, and hare in the forest-plains zone; boar, lynx, and acclimatized bison in mountain-forest zone. In the high mountains, rare species such as Dagestan mountain goat and roe deer are subject to protection.

5.6.2.4 Protected natural areas

Currently, the entire highlands of the Republic are a republican sanctuary inherited from the former Tchecheno-Ingushskaya ASSR. Its area is 70,000 ha, including 34,000 ha of forests and 36,000 ha of meadows and small meadows. In total, 57 species of mammals and 200 species of birds are found there. Since the sanctuary is almost inaccessible, the landscapes as well as flora and fauna are practically intact. Protection in the reservation is extended to roe deer and Dagestansky bison; valuable flora species include Caucasus blackberry and fruit yew, Valentine wild rose, forests with *Pteridium aquilinum*, and Greek

mountain ash. However, the protection of landscapes in this mountainous area is subject to many difficulties of control, related to the penetration and even concentration of militants in this region.

The intermountain depressions along the Assa and Armha rivers are in need of special protection. In these are unique landscape combinations and a complex cultural landscape; in the recent past, these areas were heavily inhabited, and today one can see ruins of typical constructions and graveyards.

5.6.3 Human influences on landscape and biological diversity

5.6.3.1 Land use structure

About 60% of the Republic is occupied by agricultural land. A considerable proportion (about 25%) is covered by forests in the mountains and the nature protection zones (former Tchecheno-Ingushsky reservation). This land use structure is objectively justified by the barely accessible high mountains of the Republic and the relatively densely populated foothill-plains zone where the capital as well as the agricultural and industrial enterprises are situated.

5.6.3.2 Agriculture

Over half cereals (52.5%) of the agricultural land isused to grow cereals, followed by technical crops (mainly sunflower), and vegetables and cucurbits (6.8%). These lands are located in the foothill-plains and forest-plains landscapes of the Sunja and Alhanchurtskaya valleys. Fodder crops occupy about 35.4% of the agricultural land, in the two above-mentioned valleys as well as the lowland zone and the Sujensky and Tersky forward ranges. Intensified agricultural activities have resulted in a new landscape on the foothill plains. In comparison to the pre-reform period, the use of mineral fertilizers has decreased to less than 100^{th} of the previous level, and that of organic fertilizers by more than 20 times, accompanied by the decline in the fertility of chernozem soils. Soil erosion is a major environmental problem.

5.6.3.3 Forestry

Forest cover in the Republic is about 25%, more than in any of the other Northern Caucasus republics. This is primarily related to the intact condition of the mountain forests in the mountain sanctuary. Broadleaf forests outside the sanctuary have experienced considerable impacts from long-term economic activities (pasturing, logging) and now remain in small groves in rocky and inaccessible areas. Although there is no commercial logging, there was major

damage to the forests during the years of economic instability when the mountain villages had no regular fuel supply.

5.6.3.4 Recreation and tourism

One can speak of recreation and tourism in the Republic only in the past tense. Instability and proximity to military conflicts have practically destroyed tourist activities. Until the 1990s, the mountains of Nazransky raion (Assa and Armha river valleys) were frequently visited by tourists, and were crossed by tourist routes into Georgia and along the Transcaucasus highway.

5.6.3.5 Hunting and fishing

Hunting and fishing are underdeveloped. In the mountain areas, adjacent to military conflict zones, illegal hunting is rampant. This is facilitated by the large quantities of firearms available to local residents.

5.6.3.6 Industry, transport and mineral resources mining

Ingushetia's main industry, producing the bulk of income, is the extraction of oil and gas condensate in the foothills. As a result of Tchechen crisis, oil deliveries from Tchechnia have ceased, and so oil production in Ingushetia has drastically increased. This has been accompanied by the emergence of environmental problems within the oil production facilities, particularly on small, frequently illegal sites.

There are 136 industrial enterprises and two power heating stations in the Republic, which is crossed by three oil pipelines and three gas pipelines. The length of railways is 34 km, and that of paved roads 1,100 km.

In the 1980s, construction of a railway tunnel began along the road from Georgia to Russia through the Assa river valley. Valuable landscapes of intermountain depressions in the upper parts of this river valley, where the construction of one of the main stations was envisaged, were threatened. In the 1990s, this construction was suspended.

5.6.3.7 Military activities

There are two major hotspots of military activities in the Republic: regions near the border with North Ossetia and Tchechnia. The conflict between North Ossetia and Ingushetia has mostly affected the foothill-lowlands zone adjacent to Vladikavkaz (the eastern foothills regions have for a long time been inhabited by Ingushs). Constant ethnic tension, the migration of people, and the concentration of weapons and explosives have all moved environmental problems into the background.

Along the entire border with Tchechenia, landscapes are directly affected by the movement of heavy vehicles and tanks. Frequent explosions and firing make animals migrate to the high mountains, Georgia and North Ossetia.

5.6.3.8 Air pollution

An increase in air pollution in the foothill part is related to military activities. According to official data, about 40 tons of solid substances are annually released into the air.

5.6.4 Framework for the management of natural resources

5.6.4.1 State planning

The State services of the young Ingushskaia Republic are still developing. The Republic had no institutions of higher education in its territory to train personnel to address ecological problems, and many government officers still have no experience in this field. Ingushetia receives considerable State support; in 1995, state investments accounted for 95.8% of the total investments, and their per capita level was twice as much as in the other northern Caucasus regions. However, the complicated military and political situation does not make it possible to implement the Republic's ecological programme.

5.6.4.2 State and administrative control

The main function of the state ecological organization is quantitative estimation and evaluation since, for objective reasons, there are no means to improve the situation. However, in recent years, organizations engaged in ecological work have intensified their activities in the heavily inhabited capital region. The State Committee on Land Resources has initiated works related to land use control. The main control centres include the republican and local rural and urban administrations.

5.6.4.3 Non-governmental organizations

There are practically no non-governmental organizations engaged in environmental protection activities. This is explained primarily by the fact that they receive practically none of the advantages and incentives available to political and religious organizations. Some information can be received from the organizations listed in Appendix 2.

5.6.4.4 Cooperation, projects

The state ecological programmes financed directly by Moscow focus mainly on the evaluation of potential sources of emergencies. According to monitoring data, from 1993 to 1997 there were 15 emergencies including 12 of technogenic nature, mainly fires and explosions affecting economic and transport facilities.

5.7 Tchechen Republic Ichkeria

5.7.1 Introduction

The Tchechen Republic Ichkeria was founded in 1991. Although a transitional period has been declared for marking borders with Ingushetia, most of Tchechnia (16,500 sq. km) is located in 12 of the former 15 raions of the former Tchecheno-Ingushskaya ASSR. Its longest border is with Dagestan, followed by borders with Ingushetia, Georgia, and Stavropolsky kray.

As of January 1, 1997 the population of Tchechnia was 813,000 (according to unofficial data, today it amounts to 400,000), with 100,000 in three main mountain regions (Vedensky, Shatoevsky and Nojai-Yurtovsky raions; 1989 data). During the periods of military conflicts, about 400,000 people migrated from the Republic (including 200,000 Russian-speaking people). The high mountains in the south and the deserts in the north are poorly inhabited.

5.7.2 Landscape and Biological Diversity

5.7.2.1 Landscape Diversity

Tchechnia's landscapes are characterized by a high degree of change as a result of long-term human activities (Table 5.11). Semi-desert landscapes occupy the left bank of the Terek river. These include sand landscapes with fragments of aeolian relief and semi-desert landscapes on light brown-nut and alluvial-meadow carbonate soils, in the Terek river valley. The plains belt to the south of the Terek river (Tchechenskaya plains) is occupied by secondary mixed herbs-grass and meadow plains on chernozems, almost all of which have been ploughed. In the northwest of the Republic, there are plains and forest plains in the foothills of the Tersky and Sunjensky mountains, with fragments of birak forests on brown-nut soils. To the east of the Tchechen plains, foothill plains stretch up to low hills which form a narrow strip on meadow-chernozem soils.

From an altitude of 250 m (in the east) and 350 m (in the west) up to 1,500-1,800 m (and occasionally 2,500 m) is a mountain-forest belt on brown mountain forest, and sometimes podzolized soils. Oak forests are widespread in the low hills in the east of the Republic in Urus-Martanovsky raion. In some places, the mountain-forest belt is replaced by secondary forest-meadow landscapes on gray-brown mountain-forest soils.

Beech/white beech forests grow in groves on brown mountain soils in the central mountains. The northern slopes of the Rocky range are covered by central-mountain beech, white beech, and maple forests, replaced at higher altitudes by subalpine meadows - though these are at a relatively low altitude.

Table 5.11 Tchechnia's Landscape and Biological Diversity

Zone	Population (%)	Dominant land use	Typical landscapes	Rare and valuable landscapes	Typical flora species	Rare and valuable flora species	Typical fauna species	Rare and valuable fauna species
Semi-desert plains	10	pasturing animal husbandry, cereal production	semi-desert and semi-desert-plains	mixed herbs-grassy plains, floodplains forests, Amautskaya pine grove	Wormwood, feather grass, *Melilotus*	*Colchicum lactum. Colligonum aphyllum, Astragalus*	Plains pole cat, fox	*Otistarda. Otistetrax*
Foothill, plains and forest-plains	78	gardening, oil extraction industry	plains and forward ranges hills-foothills with plains and forest-plains landscapes	Birak forests, meadow plains on chernozems	*Festuca,* typchak, *Rosa spinossima*	oak,*Amygdalus nana,Papaver bracleatum*	fox, gopher	*Lynx lynx,* pheasant
Low and middle mountain forest (350 to 1,800m)	12	mountain land cultivation and animal husbandry	oak forests, beech/white beech forests and forest-meadows landscapes	yew forests (of fruit yew) maple high-herbs, xerophite landscapes of intermountain-depressions	Caucasus beech, pear, highland maple, white beeches	fruit yew	boar, weasel	brown bear
High mountains (over 1,800-2,500m) small-leafed deciduous/ coniferous forests, meadows and nival-glacial		animal husbandry	subalpine and alpine grassy-high herbs, nival-glacial (from 3,400m)	birch-pine valley forests	*Festuca, Zerna variegata,* sedge, matgrass	Caucasus rhododendron. perennial pea		*Capra aegagrus*

To the south of the Rocky range, along the Argun and Itum-Kale river valleys, are arid inter-mountain depressions with semi-desert vegetation below, and mountain-plains landscapes on the slopes above. To the south of the Rocky range on the northern macroslopes of the Side range, mountain-meadow subalpine landscapes stretch from 1,400-1,300 to 1,800 m (in the valleys, up to 2,500 m) with stands of elfin birch woodland on mountain-meadow subalpine soils. Above 2,000-2,500 m are alpine and sub-nival landscapes. Nival-glacial landscapes are located in two big islands around the highest summits, including Tebulos-Mta (4,492 m), the highest mountain in the Republic.

5.7.2.2 Floristic diversity

In the semi-deserts, there is very little vegetation, with many sand-loving plants, and the sands are eroded. Communities of *Cynodon* are widespread, as well as forests of *Melilotus racemocus.* Desert species are represented by *Psammophites.* Shrubs include *Prunus stepposa, Colligonum aphyllum* and *Pynus salicifolia.* There are also such rare species as *Colligonum aphyllum* and *Colchicum lactum.*

To the south of the Terek, outside its floodplain, are heterogeneous plains, apart from the Tersky and Sunjensky ranges, whose slopes are covered with trees (birak forests of oak, field maple, and karagach (*Ulmus foliacea*).

On more humid slopes to the north and west are mixed herbs-grass and even meadows plains with *Onobrychis, Medicago,* and *Trifolium.* Thickets of *Leucanthemum vulgare* are typical. The most widespread shrubs include *Amygdalus nana* and *Rosa spinossima.* The most rare and valuable species in need of protection are *Papaver bracteatum* and *Orchis tridentata.* To the east, grass-wormwood plains are replaced by semi-deserts with thorny shrubs, including *Paliurus spinachrist,* and *Crambe.*

The forest belt is characterized by wild fruit and beech/white beech secondary forests (*Fagetum, Quercetum Carpineum*). In the eastern forests, vines such as *Rubia tinctoria* are typical. Other species include *Viola mirabilis, V. elatior, Viscum album, Tagetum vacciniosum,* and *Monotropa hypopitus.* Maple (*Acer trautvetteri*) forests are very typical for this zone, while birch and alder forests are more rare. High herbs include *Delphinium sp.,* and *Heracleum sp.* Linden (*Tilia cordatd*) forests are extremely rare. In secondary meadows are high herbs and forest species (thickets of *Sielene Wallichiana*), and ferns.

Along river valleys above the forest belts behind the Rocky range, vegetation is xerophytic with typical species such as *Phrygana, Astragalus denudatus, A. caucasicus* and *Puliurus spino-christi.* Here one can find the rare species *Caragana grandiflora.*

The vegetation of the subalpine belt includes mixed herbs and grass-sedge meadows, with some shrub and tree species. The flora is dominated by *Festuca varia, Zerna variegata, Rhododendron ponticum, R. caucasicum,* and

Juniperus. The alpine belt has low herbs and grass-sedge meadows and wastelands. The alpine flora is dominated by *Taraxacum sp., Vavilovia formosa*, and *Saxifraga ruprechtii*.

5.7.2.3 Fauna diversity

The most diverse areas are the highlands, semi-deserts, and plains since they are less affected by economic activities. In the semi-deserts and plains are the following Red Book species: *Tetrax tetrax* and *Otis tarda*; in the plains, lun, *Lynx lynx*, pheasant, Greek turtle, and *Lacerta*. In the high mountains, *Capra aegagrus* is protected.

As a result of military activities, and the many weapons available to the population, the fauna faces mass destruction. Many species have migrated to the neighbouring republics where their number is growing (for instance, the increase in the number of wolves in neighbouring North Ossetia and Kabardino-Balkaria).

5.7.2.4 Protected natural areas

Before the crisis there were eight reservations in Tchechnia, mainly in the highlands, semi-desert, and plains (Table 5.12). Currently, in the Stepnoy and Parabochevsky reservations, protection is extended to species such as *Tetrax tetrax* and *Otis tarda* and, in Staro-Sunjensky and Bragunsky, *Lynx lynx* and pheasant.

Table 5.12 Hunting reservations in Tchechnia

	Area (sq. km)	**Typical landscapes**
Stepnoy	52	Dry plains
Parabochevsky	12	Floodplain forests (Terek)
Bragunsky	17	Floodplain forests (Terek)
Argunsky	15	Floodplain forests (Sunja, Argun)
Shalinsky	26.3	Low mountain broadleaf forests
Urus-Martanovsky	31	Low-middle mountain broadleaf forests
Vedensky	43.7	Middle - high mountain forests
Sovetsky	100.5	Middle-high mountain forests and meadows

The heavily inhabited central mountains and highlands are not protected; in these areas it is necessary to extend protection to *Fagus orientalis, Acer platanoides, Cornus mas, Quercus petraea, Q. robur, Valeriana officinalis* and *Convallaria transcaucasica.* In the plans for natural area protection it was envisaged to declare the following territories as reserves or sanctuaries:

1) the Itum-Kalinsky arid depression, with many relics of Dagestan origin, including shrubs and herbs;
2) the effluents of the Sharo-Argun, an area characterized by widespread sub-nival and alpine species, also including the Tebulos-Mta block with original petrophite flora;
3) the area of Kezenoi-Am lake with Dagestan xerophites; manifestations of former xerophytic proliferation in the high mountains;
4) forest islands with tamarisk thickets in the lower part of the Sunja river and the adjacent part of the Terek river, with *Periploca graeca, Althaea officinalis, Populus hibrida,* and *Erianthus purpurascens*;
5) the Gehinskaya yew grove, about 25 km above Roshni-Chu with Tertiary forest species; one such sanctuary along the Fortanga river has already been established (Nethoiskaya yew grove);
6) the forests in the lower parts of the Fortanga and Assa rivers where *Cornus mas, Valeriana officinalis, Viola odorata,* and *Euphoria sp.* grow;
7) the plains slope of the Tersky range east of Kalinovskaya village, with such typical species as *Papaver bracteatum, Compositae sp., Paeonia sp., Amygdlus communis, Onobrychis sp.* and other northern Caucasus plains species.

5.7.3 Human influences on landscape and biological diversity

5.7.3.1 Land use structure

Most of the land is used for agriculture (about 65%). Nature protection lands (hunting farms) occupy 18% of the Republic.

5.7.3.2 Agriculture

According to early 1990s data, agricultural land use was equally divided between cereals and fodder crops (totalling 89%) followed by potato, vegetable, and cucurbit cultivation (5.7%), as well as technical crops (5.2%). Today the structure of agricultural land use has undergone considerable changes. Due to lack of machinery and fertilizers, more than half of the agricultural fields (according to certain estimates, 75%) are not cultivated but used for grazing. The shift to animal husbandry has created major problems, particularly in the foothills as well as in the low- and middle-mountain zones. Unregulated and

unorganized pasturing is facilitated by a general management crisis. The system of collective and state farms has collapsed. Land reserves in the mountains (over 80% of the total area of the mountain zone), which were used before mass resettlement from these territories to the plains, have begun to be used.

5.7.3.3 Forestry

About 18% of the Republic is forested, mainly in the foothills. Comparatively large blocks can be also found on the plains in the Terek river valley. Mountain forests are very sparse. The forests are all endangered by uncontrolled logging and grazing. Local traditions prohibit the cutting of certain species, for example *Pyrus caucasica*, which is considered a sacred tree.

5.7.3.4 Recreation and tourism

There are mineral springs on the plains as well as tourist paths. In the present circumstances and in the nearest future it seems unrealistic to speak of any tourist activity.

5.7.3.5 Hunting and fishing

All the eight hunting farms which regulate hunting are now inoperational. Illegal hunting is rampant, facilitated by the wide access of the population to weapons of all kinds.

5.7.3.6 Industry and mineral resources mining

Before the crisis, Tchechnia possessed a powerful industry, mainly comprising oil-extraction (23 oil fields) and petrochemical industries. In the 1970s, 20 million tons of oil were extracted each year. Today, many oil deposits and oil primary processing plants have been demolished, closed or operate occasionally. According to official data, about 500,000 tons of oil are now extracted annually. The State crisis and the lack of a legal framework have facilitated the emergence of numerous private firms which extract and process small amounts of oil and then sell it illegally to other Caucasus republics (500,000-600,000 tons a year). The locations of these private firms are hotspots for ecological disasters.

5.7.3.7 Military activities

Military activities conducted since 1993 have caused enormous damage to the environment. The main ecological implications include:

1) drastic fauna impoverishment, migration of many species, for instance practically all predators, from the Republic;
2) pollution of soils and vegetation in the foothills, as a result of damage to oil extraction facilities, pipelines and petrochemical plants; over 100,000 ha have been polluted;
3) pollution of air, water, and soils as a result of many fires, especially at oil fields;
4) destruction of large blocks of forest due to fires, bombing, and the construction of roads for large vehicles. According to the most modest estimates, about one third of the Republic's forests have been subjected to different kinds of impact;
5) the entire previously available system of nature protection activities has been destroyed, scientific staff have left the Republic, scientific research stations have been abandoned, and operational experience has been lost.

One can reasonably speak of ecological disaster threatening the Republic's landscape and biological diversity.

5.7.4 Framework for the management of natural resources

5.7.4.1 State planning and state and administrative control

Tchechnia faces the development of state order and the introduction of new forms of administration, such as Shariat courts. There is no state ecological policy, and the state has practically withdrawn from nature protection. The isolation of the Republic impedes the introduction of control and the provision of assistance by international ecological organizations.

The only operational management bodies are informal local rural communities in which the elders play the dominant role. The strategy of survival pursued by Tchechen people over the many centuries of their existence has been connected to a subsistence economy, based on the use of local resources unofficially regulated by rural communities.

5.7.4.2 Non-governmental organizations

The economic and political isolation of Tchechnia has impeded the implementation of research and the evaluation of the state of the Republic's landscape and biological diversity. Today, the most important function of the informal sector bodies (Appendix 2) is the informational function. The activities of different organizations and individual researchers require coordination. The main sources of information are eye-witness data and remote research.

5.7.4.3 Cooperation, projects

Before the war, the Faculty of Nature Use at Grozny University was developing a nature conservation concept in the regions of high concentration of oil industry, and research was done on the implementation of nature conservation in the plains and semi-deserts. In the Groznensky Oil Institute, resource-saving technologies were developed. Most scientists and experts have now migrated from the Republic. The monitoring of ecological processes which threaten people's lives is conducted by the federal Ministry on emergency situations. Individual projects are supported by international foundations, for instance, ISAR, and the "War and Ecology" project undertaken carried out by the ecological group "Pecheneg" from Kharkov.

5.8 Stavropolsky kray

5.8.1 Introduction

Stavropolsky kray occupies the central part of the Pre-Caucasus region, the western part of the Precaspian lowlands, and parts of the northern slopes of the forward ranges of Great Caucasus. This is the region of the Northern Caucasus with the largest population (2,667,000 people; urban 54%). Within 66,500 sq. km are 26 rural administrative raions, 18 cities, and seven towns. Stavropolsky kray has a smaller mountain area than any of the other Caucasus regions: the foothill-lowlands zone is 3% of the kray's area. However, the geological and geomorphological similarity of Stavropolsky kray and the Caucasus, the set of basic types of landscapes in the plains, and the inversion of zonal landscape borders in the plains, as well as the complex of social and ecological problems justify the inclusion of Stavropolsky kray within the Caucasus.

In terms of its relief, Stavropolsky kray is divided into the plains; the Stavropolsky highlands, separated into several flat-topped mountains (the highest is Strijament, 831 m); and the foothill-lowland strip which includes elements of the main range with a maximum altitude of 1,603 m. Of note are the Piatigorsky volcanic region with numerous dome-shaped mountains (e.g., Mashuk, 994 m) and mineral springs.

5.8.2 Landscape and biological diversity

5.8.2.1 Landscape diversity

The Caucasus system creates an inversion of the plains landscape zones: in the south, the semi-desert zone is replaced by plains and then by forest plains. This general order is influenced by a complex geological and geomorphological structure: from marine plains in the northeast to foothill ranges (Table 5.13).

At altitudes below 100 m are semi-desert landscapes of low plains on Precaspian marine sediments with light brown nut soils and areas of sand covered by grass-wormwood and grass-dry plains vegetation. Above 200 m, stretching in a southwest direction, are low dry plains landscapes of on forest-type brown nut soils covered by grass-wormwood and grass-dry plains vegetation. Above 300-400 m are plains on chernozems, frequently with solonetz and grass-wormwood saline vegetation. Above 500 m are highland forest-plains landscapes, with birak forests and grass-mixed herbs plains on ordinary and leached chernozems. On the plains of the Stavropolsky highlands are small areas of meadows on gray forest soils and leached chernozems.

Table 5.13 Stavropolsky kray's landscape and biological diversity

Zone	Population (%)	Dominant land use	Typical landscapes	Rare and valuable landscapes	Typical flora species	Rare and valuable flora species	Typical fauna species	Rare and valuable fauna species
Low plains	60	pasturing animal husbandry	semi-desert marine plains grassy-wormwood on light brown nut soils	grassy-wormwood plains	wormwood, *Salsola*, typchak	*Euphorbia aristata, Hedisarum ardentum*	water rat, *Felischaus*	*Otistetrax, Lynx lynx, Vulpescorsac*
Plains (<400m)	25	cereal production, animal husbandry	flat-curved plains on forest-type soils with grassy-wormwood and dry-plains vegetation on brown nut soils	feather grass plains, small canyons with bushy plains	feather grass, typchak, *Limonium*	*Crambe.Stipa dasyphylla. Papaver bracteatum*	gopher, hamster, rodents, lark	*Otistarda, Erodium*
Foothill-plains and forest-plains (300-500 to 841m)	12	cereal production	pastures divided by forest strips on chernozems	birak forests and spots of grassy-mixed herbs plains	sage, *Adonis*, Violet, feather grass	*Helleborus caucasicus. Anemoneblanda*	otter, weasel	grey rat, boar
Foothills-low hills forest plains (200 to 1,603m)	3	recreational industry	pastures with spots of bushy plains on chernozems	Tertiary crests with meadow-type plains, Piatigorie laccoliths with beech, white beech, and oak forests	*Crataegus, Cornus, Allium*	*Crocus, Asphodelina, Globularia*	weasel, hare	wild cat

The southern and southwestern part of the kray is occupied by landscapes of terraced foothills and Tertiary crests, on neogene-quaternary sediments with mixed herbs-grass meadow plains on ordinary and leached chernozems. The most unusual are the landscapes of Piatigorie laccoliths with Cretaceous and Tertiary sediments and trahiliparites with beech, white beech, and oak forests on gray forest soils and grass-mixed herbs plains on ordinary and leached chernozems.

5.8.2.2 Floristic diversity

There are 163 rare and disappearing species of plants, including several species of *Crambe, Papaver bracteatum, Tulipa shrenkii, Helleborus caucasicus, Anemone blanda, Ramunculus anemonifolius, Solenanthus bibersteinii, Crocus speciosus, Globularia aphyllantes, Campanula persicifolia, Stipa dasyphylla, Sternbergia colchiciflora,* and *Pushkinia salloides.* Endemic species include *Euphorbia aristata, E. normannii, Erodium stevenii, Hedisarum ardentum, Iris notha, I. humilis, Asphodelina tenuilor, Eremurus spectabilis, Dianthus fragrans,* and *Euonymus nana.*

5.8.2.3 Fauna diversity

Due to the high level of agricultural development, the fauna is relatively poor. Typical representatives of semi-deserts (*Otis tetrax, Lynx lynx)* and plains *(Otis tarda, Grus*) are under protection.

5.8.2.4 Protected natural areas

Most protected territories are valuable nature monuments for the local protection of rare plant and animal species in an environment with a high level of development (ploughed fields). Many nature monuments are located in the Piatigorie area, which was declared in 1992 an ecological-recreational region with a special nature use regime (the Caucasus Mineral Waters).

To preserve natural vegetation communities with rare and disappearing species, the following territories should be declared as reserves and sanctuaries with an adequate protection regime:

1) most of the laccolith mountains (Camel, Bull, Razvalka, Medovaya, Mashuk, etc.), with three types of glacial flora: "permafrost" on Razvalka mountain and the summit of Beshtau mountain; holocenous forest (Beshtau mountain); xerothermic (Mashuk mountain);
2) the area of Medvedka mountain where Wurm subalpine species are preserved (e.g., *Anthericum ramosum*);
3) Strijament mountain (beech forests) and Nedremannaya mountain where, until recently, virgin plains were maintained.

5.8.3 Human influences on landscape and biological diversity

5.8.3.1 Land use structure

Stavropolsky kray is characterized by a high degree of development. The land use is mainly agricultural. The eastern part is distinguished by developed animal husbandry and oil and gas extraction; the central part by cereal production; the northwestern area - where Stavropol is situated - by intensive irrigated agriculture and industry; and the southern part by a significant proportion of nature protection and recreational lands.

5.8.3.2 Agriculture

About 60% of the ploughed fields are occupied by cereals, 26.7% by fodder crops, 10.7% by technical crops, and 2.6% by potatoes and cucurbit cultivation. The main branch of animal husbandry - breeding of sheep with fine wool - is in the semi-desert zone.

5.8.3.3 Forestry

The kray's forests occupy less than 1% of its area. Most have water protection and recreational significance. There are urgent problems of forest restoration and establishment of forest strips on sands (eastern part) and gullies (low hill and foothill zones).

5.8.3.4 Recreation and tourism

The Protected Region of the Caucasus Mineral Waters was created by a decree of the President of the Russian Federation in order to protect and recreate the natural resources, medical mineral waters, vegetation, landscape and cultural monuments of the region. Of the 22 resorts, Kislovodsk (13,200 beds in health resorts), Essentuki (10,900), Piatigorsk (7,300) and Zheleznovodsk (5,700) as well as the Mineral Waters are the main and traditional centres for treatment and recreation. In Russia, they are second only to the Black Sea coast in the availability of recreational resources (for instance, in Kislovodsk there more than 280 sunny days a year). Treatment is the leading function, and most patients stay longer than 21 days.

5.8.3.5 Industry and transport

The main branches of industry are electricity production (six power stations), food and light industry which use agricultural products, and chemical industry

(plastics, nitrogen fertilizers, etc.). The kray is crossed by one gas pipeline and three oil pipelines. There are 928 km of railways.

5.8.3.6 Mineral resources mining

Annually the kray produced more than 1 billion m^3 of natural gas, from 16 gas fields, and over 2 million tons of oil (late 1980s data). Today the volume of production has decreased somewhat, though the role of the oil and gas complex has increased, especially after the crisis in Tchechnia.

5.8.3.7 Military activities

As Stavropolsky kray is close to many military conflicts, especially in Tchechnia, there is a high concentration of military equipment, which causes enormous damage to the flora and fauna of plains and semi-deserts.

5.8.3.8 Air and water pollution

According to official data, annually 1,900 tons of solid substances are released into the air and 37,090,000 m^3 of waste waters are polluted.

5.8.4 Framework for the management of natural resources

5.8.4.1 State planning

The State planning of nature protection activities is conducted through the State support of different programmes, including the ecological safety programme.

5.8.4.2 State and administrative control

State and administrative control is conducted on three main levels:

- from Moscow; the main centres of interest are the area of the Caucasus Mineral Waters and other strategic sites;
- in Stavropol, where the main administrative and management infrastructure and scientific research institutes are located. Among the most active are the Committee on Land Resources; and, of the scientific research institutes, the Institute of Agriculture;
- in the raions' centres. At this level, nature conservation activities differ from raion to raion. Traditionally, the cities of the Caucasus Mineral Waters are powerful. For instance, management bodies in Kislovodsk employ a modern geo-informational system (for land evaluation purposes), and there is a regional geo-informational centre in Piatigorsk.

5.8.4.3 Non-governmental organizations

The activities of non-governmental organizations (Appendix 2) are gaining momentum.

5.8.4.4 Cooperation, projects

A traditional field of cooperation in the kray is related to the development of environmentally sound methods of agriculture - the main type of land use in the kray.

5.9 Dagestan

5.9.1 Introduction

Dagestan Republic has an area of 50,300 sq. km. and is situated at the northeastern edge of the North Caucasus adjacent to the Caspian Sea. Although Dagestan means "the mountain country", most of its area (over 40%) is in the Precaspian lowlands.

Dagestan is separated from the neighbouring republics mainly by natural borders (mountain ranges, rivers, and the sea). In the southeast and south, it has a common border with Azerbaijan along the Samur river and the main Caucasus range (325 km); in the southwest, with Georgia (155 km); in the west, along the Snegovoy and Andiisky ranges, with Tchechnia (328 km); in the northeast, across the Nagaiskaya plains, with Stavropolsky kray (355 km); and in the north, along the dry bed of the Kuma river, with Kalmykia. The coast is 530 km long.

Dagestan's population is 2,098,000, of whom 1,222,000 live in rural areas. A peculiarity of the Republic is its multi-ethnic character. Almost every administrative raion is inhabited by a separate ethnic group. There are 41 raions, three municipal areas, 10 cities of republican subordination, and 676 rural administrations.

5.9.2 Landscape and biological diversity

5.9.2.1 Landscape diversity

Dagestan's plains have three types of landscapes:

1) the semi-deserts of Prikumie, on marine plains, with sandy light brown-nut soils covered by psammophite grass-mixed herbs communities, sandy loam brown-nut soils with grass-ephemeral wormwood communities, and clay-loam saline light brown-nut soils with ephemeral saline wormwood communities;
2) semi-deserts on marine terraces, with brown-nut soils covered by grass-wormwood and saline communities - widespread along the Caspian Sea coast;
3) meadows-swamps-plains delta landscapes (Terek river delta) with reed/cat tail, reed grass and wormwood-grass vegetation, frequently with saline soils.

Transitional landscapes between the plains and foothills include the dry-plains landscapes of the marine terraces, with brown-nut soils covered by wormwood-grass vegetation and shrubs. Dagestan's foothills have mountains-plains landscapes with brown-nut and chernozem soils covered by mixed herbs-

grass and mixed herbs-wormwood-grass vegetation, and forest-plains landscapes with brown-nut, brown and, more rarely, mountain-forest brown soils covered by grass-wormwood-mixed herbs plains, with sparse oak and white beech forest.

Higher on the slopes (from 600 m), forest plains acquire meadow elements and change into secondary meadow plains of low mountains (with broadleaf forests) with chernozem-like meadow soils covered by grass-mixed herbs vegetation. Where human activities are less intensive, there are islands of low mountain beech and white beech landscapes on brown mountain forest soils.

The forest belt between the low and middle mountains is interrupted by vast valley-depression landscapes with gravel brown-nut soils, xerophytic mixed herbs, and shrub communities. The most unusual are landscapes along the Andiisky, Avarsky, Kazikumuhsky Koisu and Karakoisu river valleys. In their upper parts, these plains change into, first, middle mountain-plains with brown-nut and chernozem soils covered by grass-mixed herb vegetation and, then, into meadow-plains with meadow soils covered by low sedge-grass-mixed herbs communities with areas of small-leafed deciduous/coniferous and, more rarely, beech and oak forests.

The forest belt in the middle mountains stretches up to 1,800 m and includes fragments of pine and birch forests on mountain brown soils. Above 1,800 m is the mountain-meadows belt consisting of subalpine, alpine meadows and sub-nival small meadows adjacent to nival-glacial belts.

In general, the altitude-zonal landscape distribution is expressed only in the high mountains (above 2,000 m) and the plains and foothills (Table 5.14). In the foothills and middle-mountain zones, the altitudinal zoning has been destroyed through long-term human activities and complicated climatic, geological and geomorphological conditions.

5.9.2.2 Floristic diversity

Of the more than 4,000 plant species in the Republic, 80 are rare or disappearing. Not only the flora composition but the very forest communities of the Samur river delta are unique, combining nemoral and sub-tropical elements. In their composition and the structure of their phytocoenoses, these forests are close to Girkansky Tertiary forests. The vegetation of the Samursky forests includes 532 plant species, of which 20 are registered in the Red Book of the former USSR and RSFSR and 43 in Dagestan's Red Book.

5.9.2.3 Fauna diversity

There are 89 species of mammals, 300 of birds, and 92 of fish. The unusual intra-zone fauna of the Samursky forests includes 31 species registered in the Red Book of the USSR and RSFSR. They include *Phoenicopterus roseus*,

Table 5.14 Dagestan's Landscape and Biological Diversity

Zone	Area (mln ha and %)	Population (%)	Dominant land use	Typical landscapes	Rare and valuable landscapes	Typical flora species	Rare and valuable flora species	Typical fauna species	Rare and valuable fauna species
Plains (<200m)	2.35 44%	65	pasturing, animal husbandry	semi-desert, marine plains, meadows-swamps-plains delta and dry-plains sea terraces	dry-plains shrubs	feather grass, reed, *Salsolae*, cane, acacia	*Cladium, Trapa,Iris, Hedera pastucovii*	plains pole cat, hamster, gopher, mole rat, sand badger	*Otistarda, Otistetrax, Lynx lynx, Erodium, Dipus*
Foothill-middle mountains (200-1,000m)	0.84 16%	14	horticulture	mountain-plains, mountain-forest plains, mountain forest	beech-oak on mountain-brown forest soils, floodplain vine forests	feather grass, typchak, grabinnik, *Berberis*, wild rose, sloe	Caucasus beech, oak, onion, fruit yew	fox, badger, wolf, jackal, marten, wild cat	Pheasant, horned owl, roe deer
Middle mountain (1,000 to 2,000m)	0.95 18%	12	horticulture, animal husbandry	mountain-plains, xerophite, rarely mountain forest	birch-pine forests on brown mountain-forest soils	*Salvia. Bothriochloa, Astragalus, Ephedra, Cirsium*	Radde birch, juniper	chamois, hare, fox, lynx	*Capra aeragrus.* brown bear, leopard eagle, *Aegypinus*
High mountains (>2,000m)	1.17 22%	9	animal husbandry	subalpine and alpine grassy-mixed herbs	subalpine mixed herbs	*Festuca, Poa, Carex gentiana, Trifolium*	*Saxifraga, Lilium*	*Corvusalpini*	Dagestan bison, *Lyrurus,* mountain turkey

Pelecanus onocrotalus, Egretta alba, E. eulophotes, roe deer and some relic species whose close relatives can be found today only in the Philippines and southern India.

5.9.2.4 Protected natural areas and their development

There are one reserve and eight sanctuaries covering practically all of the high mountains (Table 5.15). The Dagestan reserve, established in 1992, consists of **two parts:** Kizliarsky (18,500 ha including a 9,300 ha marine area) and Sarykumsky. The Kizliarsky site is designed to protect the unique underwater areas merging into littoral fluxes, meadow-wetlands, and meadow-saline communities. The flora includes such rare species as *Cladium mariskus* and *Trapa natus.* In reed thickets are boar, wild cat, and muskrat; bird species such as *Cygnus olar* overwinter. The Sarykumsky Barhan site (576 ha) is situated in Buinaksky raion, approximately 25 km northeast of Mahachkala. Barhan Sarykum (261 m) is characterized by rich vegetation (including *Populus, Elaeagnaceas, Robinia, Phragmites, Bidens*) near springs which grade into **unique** psammophite vegetation on the barhan's slopes (e.g., *Iris acutiloba*). **Other** interesting species include *Hemiechinus auritus* and *Dipus sagitta.*

Table 5.15 Dagestan's protected natural areas

	Area (ha)	**Typical landscapes**
Gutonsky sanctuary	60,000	mountain-meadows, nival-glacial
Charodinsky sanctuary	80,000	mountain-meadows, nival-glacial
Kaiakentsky sanctuary	27,300	broadleaf mountain forest, mountain-plains
Kasumkentsky sanctuary	26,000	broadleaf mountain forest, mountain-plains
Samursky sanctuary	20,000	floodplain forest
Khammaurtovsky sanctuary	30,000	meadow-wetlands-plains
Youngiurtovsky sanctuary	20,000	meadow-wetlands-plains
Agrahansky sanctuary	35,000	delta meadow-wetlands-plains
Dagestan reserve	19,100	semi-desert, meadow-wetlands-plains

The Gynibskoe plateau (over 2,000 m) in mountain Dagestan, unique for its natural, cultural and economic landscape elements, is in need of special forms of protection. The Samursky forests also require a stricter protection regime.

5.9.3 Human influences on landscape and biological diversity

5.9.3.1 Land use structure

The land use structure is dominated by agricultural land, especially pastures, reflecting the traditions of the population (Table 5.16).

Table 5.16 Land use in Dagestan (01.01.93)

Land Use	**Area (000 ha)**	**USE FOR AGRICULTURAL PURPOSES**					
		Total 3353.6	Ploughed fields 464.3	Perennial crops 76.6	Reserves 2.3	Hay fields 160.8	Pastures 2649.6
Settlements	786.5	511.9	18.4	3.3	0.1	18	472.1
Industry and energy	69.7	1.4	0.2			0.1	0.1
Recreation and nature protection	28.6	0.2		0.2			
Forests	434.4	29.1	1.5	1.7		3	22.9
Water	24.6	0.9		0.1			0.8
Reserve	86.1	68.1	8.9	0.9		1.7	56.6

One unusual feature of land use is that the inhabitants of Dagestan have long been using lands outside the borders of the Republic as seasonal pastures. Of the 5,108,200 ha used by the Republic's land users on 1/1/94, 303,400 ha were located outside their administrative borders. These included 158,000 ha in Kalmykia, 33,600 ha in Tchechnia, 50,000 ha in Azerbaijan, and 61,400 ha in Stavropolsky kray. At the same time, 221,800 ha of Dagestan is used by people from other republics and states.

5.9.3.2 Agriculture

Collective and state farms have proved to be sustainable structures and maintained their status after the economic crisis. In the past, there were 580 collective farms and 634 state farms; today there are 403 collective farms (including fish farms) and 275 state farms. There are 3,324,400 ha of agricultural lands within the Republic, used as follows: ploughed fields (13.8%: 9.3% of the total area); perennial crops (2.2%); hay fields (4.9%); reserved lands (0.2%); and pastures (78.9%: 52.7% of the total area).

More specific agricultural land uses are as follows: cereals and beans (13.0%), annual herbs (0.9%), perennial herbs (1.2%), silage corn (0.9%), fruit (0.5%), vineyards (1.1%), hay fields (4.8%). The remainder of the agricultural land is occupied by pastures which, together with areas used for pasturing after crop harvesting, amount to 80% of the total agricultural area.

The land occupied by settlements consists of areas occupied by rural settlements (95%) and cities and towns (5%). In the rural areas, 61.1% of the land is agricultural, and in cities and towns, 30.4%. However, 15.2% of the land occupied by settlements is unusable. In reserved land, 65.7% of the area is agricultural.

As a result of the rise of the level of the Caspian Sea, mineralized underground waters have risen higher than the critical level over a vast part of the coastal area, leading to the flooding of agricultural land. The salinization of secondary land is of special concern. From 1985 to 1991, the area of perennial crops on saline soils increased from 8,000 to 45,900 ha, and that on ploughed fields from 116,800 to 304,600 ha. In irrigated fields, salt spots have formed, occupying 10-20% of their area.

In total, 810,000 ha of agricultural land is subject to water erosion, including 90,000 ha of ploughed fields. Another 26,400 ha of ploughed fields are considerably affected by deflation. The pastures in the zone of chernozems and Kizliarskie pastures (semi-desert zone) are characterized by a marked process of hydro-morphological desertification expressed as soil salinization. As a result of irregular and excessive exploitation, the area of depleted fodder fields has increased by 18,800 ha.

5.9.3.3 Forestry

Most of the forests are concentrated in the foothills, where the largest area is occupied by reserves, as well as in the high mountains (Table 5.17). All forests belong to different protection categories (anti-erosion, water protection, etc.).

Table 5.17 Dagestan: distribution of land occupied by forests and shrubs (000 ha)

	Total area	Plains	Foothills	Low and middle mountains	High mountains (>1,800 m)
State forests	479.3	62.7	209.6	39.9	167.1
Forests of collective and state farms	40	5.9	24.0	6.5	3.6
Shrubs	76.9	20.7	39.2	10.7	6.3

5.9.3.4 Recreation and tourism

The recreational zones are along the coast of the Caspian Sea. However, the number of tourists has decreased significantly, and now mainly local residents spend their vacations there.

5.9.3.5 Hunting and fishing

Twenty years ago, up to 20-25,000 tons of sturgeon were harvested in the Caspian Sea annually. Over the last 20 years, the catch of sturgeon species decreased by 90%, and in the last three years it decreased again by a factor of three; in 1998, only 1,465 tons were harvested.

5.9.3.6 Industry and transport

Within the framework of industrial development from 1986 to 1991, about 1,800 ha of agricultural land were used for non-agricultural purposes. This included 500 ha of ploughed fields and 100 ha of perennial crops. At present, the Republic faces a decline in industrial production. Emissions from road transport amount to 140,000 tons (68.5% of the total gross emissions).

5.9.3.7 Mineral resources mining

Annually about 49-50,000 tons of toxic wastes are generated in the Republic, of which over 30,000 tons are muds buried in mud storage facilities at DagOil

drilling sites. In ecological terms, areas of oil and gas extraction in the plains semi-desert zone remain the most dangerous.

5.9.3.8 Military activities

Military activities conducted in 1999 in the Novolakinsky, Tsumadinsky, and Botlihsky mountain raions caused enormous damage to the environment. Artillery shelling and bombing resulted in heavy losses of fauna in the broadleaf mountain forests. Military activities connected, for example, with the construction of blocks on mountain roads facilitated the emergence of erosion hotspots. In the mountain-valley-depression xerophytic landscapes (Karamahi and Chabanmahi villages), there are also major hotspots of erosion caused by trench digging and explosions.

The main implications of the conflict in Tchechenia (mass arming of the population, plundering of cargo trains, attacks on passenger trains, destruction of power sub-stations) for Dagestan include: transition of the economy to an autonomous power supply; termination of traffic on the Caucasus highway; closure of many enterprises; losses due to transportation expenses; consumer price growth; inflow of arms from abroad; increase in organized crime activity; inability to efficiently regulate economic processes in the border zone where 18% of the Republic's population live.

5.9.3.9 Air and water pollution

Annually, 9,400 tons of pollutants are released into the air. Of the 92 million m^3 of wastewater which annually pass through water purification facilities, only 2.5% were purified in accordance with established norms. Due to the overloading of facilities, the remainder did not meet the established standard. In Dagestan's underground waters, which are used both for drinking and for irrigation, there are such harmful chemicals such as arsenic and phenols, at concentrations 2-10 times above MPC. Emissions of pollutants as a result of military activities are unknown.

5.9.4 Framework for management of natural resources

5.9.4.1 State planning

There are three main directions of state activities related to the issues of ecological safety: the Caspian Sea, the mountains, and the plains. These programmes are subject to the allocation of funds from the state budget and major scientific research.

5.9.4.2 State and administrative control

In the 1990s, the state and administrative control of nature protection considerably weakened due to the general instability of state power, and the emergence of illegal parallel bodies, such as islamic "vakhabism" organizations. In this regard, it is worth mentioning the autonomization of Karamahi village, situated in the valley-canyon landscapes of the middle mountains. The dry climate, fertile chernozem-type soils, and relative isolation of the area have facilitated the declaration of autonomy under the leadership of vakhabits.

In many raions, soviet institutions operate together with islamic organizations. By 1997, there were 1,913 mosques. As a result of the massive dissolution of collective and state farms, some pastures have passed to local rural communities (muslim jamaats) for collective ownership.

The traditional bodies of power operated on four levels:

1) the federal level (Moscow) plays a major role in financing ecological programmes, research institutes, individual agencies (e.g., in the field of forestry);
2) the Republican level (Mahachkala) played a dominant role in the pre-crisis period. Today only plains and foothills raions are heavily dependent on the republican centre;
3) the raion level (41 raions). In the 1990s, the role of raions in the mountainous parts of Dagestan increased considerably. The formation of raions according to the ethnic principle has always created problems with the organization of nature protection areas. The current lack of funds leads to the weakening of the authority of central bodies (e.g., the traditionally powerful Ministry of Forestry), an increased role for local authorities (raions and rural administrations), and the deterioration of nature protection activities;
4) the rural administrations, as the lowest level of management, perform statistical functions. Natural resources, particularly land, pastures and forest, are managed by rural administrations in close coordination with local communities and local traditions.

5.9.4.3 Non-governmental organizations

The activities of non-governmental organizations in the field of environmental protection are limited (Appendix 2). In particular, this relates to mountain territories where management and information functions related to the use of natural resources belong to local authorities who are reluctant to hear any outside initiatives.

5.9.4.4 Cooperation, projects

The Republican authorities have concluded a number of agreements:

- with the regional ecological centre at Dagestansky State University for the development and introduction of an economic mechanism for promoting nature conservation activities and regulation of nature protection relations in Mahachkala;
- with the Precaspian Institute of Biological Resources of the Dagestan Research Centre of the Russian Academy of Science for the preparation of an ecological map of Dagestan's soils (map of concentrations of harmful substances);
- with the Institute of Agriculture and Land Improvement (Volgograd) for the preparation of a landscape-ecological map of the status of Dagestan's Kizliarskie pastures (desertification map);
- with the Dagestansky Ecological Centre of the Dagestan Pedagogical Institute for the preparation and publication of the educational material on ecology for schools and vocational institutions and of Dagestan's Red Book.

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2. Governmental report on the state of the natural environment of the Karatchaevo-Tcherkesskaya Republic in 1988. Tcherkessk, 1999, 106 p.
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Appendix 1: Government organizations

Armenia

Ministry of Nature Protection (Minister, Shakhazian Sarcis Levonovich):
Republic of Armenia, 375002, Yerevan, Moskovskaya str., 35.
Tel. 7 3742 530741/533629. Fax: 7 3742 534902.

Azerbaijan

The State Committee on Ecology of the Azerbaijan Republic:
370073, Azerbaijan Republic, Baku, Bakhrama Agaeva str., 100a
Fax: (8922) 398432, tel: (8922) 385454.
Parliamentary Commission of Ecology (Chairman, Manafova Asia)
Fax: (8-8922) 989719. Tel: () 989796
State Commission of Natural Resources (Chairman, Islamov T.A.)
Fax: (8-8922) 925907

Georgia

Parliamentary Commission of environment and natural resources (Chairman, Kakha Chitaia)
Tel: (99532) 998127; Fax: (99532) 931306; E-mail:
epnrcmt@parliament.ge
Ministry of Environmental Protection of Georgia (Minister, Nino Chkhobadze); Tel/fax: 99532 230668
Deputy Minister: Merab Sharabidze (Focal point of Black Sea regional programmes); Tel: (99532) 337340 / 528042;
State Department of Tourism (Head of Department, Vaza Shubladze)
Tel: (99532) 226125; Fax:(99532) 294052: E-mail:tour@sdtg.postnet.ge

Russian Federation

Adygeia Republic

RA Ministry of Environment and Natural Resources Protection (Minister, Kozmenko G.G.):
352700, RA, Maikop, Gagarina str. 52, tel, 2-55-05; fax 2-12-53

RA Committee on Forestry (Chairman, Afasijev K.S.):
352700, RA, Maikop, Gagarina str. 52, tel, 2-51-58; fax 2-49-30
RA Office on Protection, Control and Regulation of the Use of Game Animals (Chief.LuzinA.V.)
352700, RA, Maikop, Gagarina str. 52, tel, 2-49-75, 2-11-77
RA Committee on Geology and Mineral Resources (Chairman, Vaganov P.N.)
352700, RA, Maikop, Krasnogvardeiskaya str., 3, tel. 3-22-22, 2-67-37
RA Committee on Land Resources and Land Improvement (Chairman, Gorbanev N.N.)
352711, RA, Maikop, Yunatov str., 7â, tel. 3-68-56, 3-86-87
RA Committee on Water Resources of the RF Goscomecologia (Chairman, Borisenko T.S.)
352700, RA, Maikop, Gogolia str., 91, kv. 2, tel. 4-57-65, 4-49-66
Specially protected ecological-tourist territory "Fisht" (Head of administration, Brichev R.H.)
RA, Maikopsky raion, Kamenomostsky town, Mira str., 25, tel. 5-35-40, 2-22-27 (Maikop)
Caucasus state natural biospheric reserve, Maikop office
252700, RF, Adygeia Republic, Maikop city, Sovetaskaya str., 187. Tel. 2-16-97, fax 2-10-61
Caucasus state natural biospheric reserve, Adler
Krasnodarsky kray, Sochi-341, K. Marx str., 8. Tel. 44051-36, 69-20-03

Karatchaevo-Tcherkesskaya Republic

Caucasus state natural biospheric reserve
Krasnodarsky kray, Sochi-341, K. Marx str., 8. Tel. 44051-36, 69-20-03
Teberdinsky state natural biospheric reserve (Director, Salpagaron Jepar Seitovich)
KTR, Teberda city, tel. 51-2-61; 51-1-97; 51-2-67

Krasnodar kray

State Committee on Environment Protection in Krasnodarsky kray (Chairman, Polovinko P.A.)
356640, Krasnodar, Krasnaya str., 19. Tel: (8612) 52-38-22/52-88-32. Fax: (8612)52-88-32.
Caucasus state natural biospheric reserve
Krasnodarsky kray, Sochi-341, K. Marx str., 8. Tel. 44051-36, 69-20-03

Kabardino-Balkaria

Committee on Geology (Chairman, Koval A.I.)
360000, Nalchik, Sovetskaya str., 100. Tel: (86622) 5-71-80.

Kabardino-Balkarsky Committee on Water Resources (Chairman, Homenko M.I.)
360030, Nalchik, Tarchkova str., 18a. Fax: (86622) 7-36-26.

State Committee on Forests (Chairman, Tcherkessov G.M.)
360004, Nalchik, Mechnikova prosp., 130a. Tel.: (86622) 5-53-63. Fax: (86622) 5-08-86.

Committee on Land resources and Land Improvement (Chairman, Klevtsov V.V.)
360030, K. Kulievs prosp., l0.Tel.: (86622) 7-21-83.

Kabardino-Balkarsky Centre on Hydro-meteorology and Monitoring of the Environment (Chairman, Tchutskov K.G.)
360602, Nalchik, Kabardinskaya str., 17. Tel: (86622) 2-55-74.

Ministry of Environment and Natural Resources Protection (Minister, Ivanov I.V.)
360000, Nalchik, Tarchokova str., 18. Tel. (86622) 7-75-80.

North Caucasus Regional Land Improvement Centre "Earth" (Director, Bashorov V.A.)
360000, Kabardino-Balkarskaya Republic, Nalchik, Gorkogo str., 4.
Tel.: (86622) 5-22-95, fax: (86622) 5-80-40.

Institute of Ecology of Mountain Territories Kabardino-Balkarya Research Centre (Director, Tembotov A.)
360000, Kabardino-Balkarskaya Republic, Nalchik, Inessy Armand str., 37a.

Division of Geography of Kabardino-Balkarsky Research Centre (Chairman, Kerimov Abdullah).
360000, Kabardino-Balkarskaya Republic, Nalchik, Inessy Armand str., 37a.
Tel.: (86622) 9-98-71

Board of RAS Kabardino-Balkarsky Research Centre (Chairman, Ivanov P.M.)
360002, Nalchik, Bazarova str, 2. Tel: (86622) 2-75-15.

Kabardino-Balkarsky Committee on Geological Monitoring (Chairman, TchulkovV.I.)
360005, Kabardino-Balkarskaya Republic, Nalchik, Kalinina str., 262.
Tel: (86622) 6-43-87.

SevKavNIIgyprozem
360000, Nalchik, Kollontai str, 6. Tel: (86622) 6-04-72.

The Mountain Geo-Physical Institute (Director, Zalihanov M.T.)
360030, Nalchik, Lenina prosp., 2. Tel: (86622) 7-04-24. Fax: (86622) 7-05-95.

Scientific Industrial Centre "Antistihia" (Director, Bolov V.P.)
360030, Nalchik, Lenina prosp, 2. Tel.: (86622) 7-10-12.

Kabardino-Balkarsky High Mountain Reserve
361805, Kabardino-Balkarskaya Republic, Kashkhatau village, Kezima Mechieva str., 78. Tel: (order) 6-17-17.
National Park "Prielbrusie"
361603, Kabardino-Balkarskaya Republic, Elbrus village, Lesnaya str., 2.

North Ossetia-Alania

North Ossetian state reserve (Director, Kabolev Zelim Khachasovich)
36320.5, Alagir, C.Basievoi str.,1, tel. +7 (8672) 3-28-40.
North Ossetian state hunting farm (Director, Khanikaev Taimuraz Gejrgievixh)
362036, Vladikavkaz, Moskovskoe shosse, tel. +7 (8672) 75-84-81.
North Ossetian national park (Director, Gogaev Artur Sultanovich)
Alania, 363500, Irafsky raion, Sovetskoe vi., tel. +7 (8672) 3-18-81.
Ministry of Environment and Nature Resources Protection (Minister, Prof. Vladimir S. Vaguin)
Iristonskaya str., 25 Vladikavkaz 362021 North Ossetia-Alania, Russia.
Tel: +7(8672) 74 95 23. Fax: +7 (8672) 74 54 63. E-mail: eco@rno.ssc.ac.ru
Committee on Water Resources Supply
Vladikavkaz, Kotzev str., 82. Tel: +7 (8672) 75 45 40
Committee on Forestry
Vladikavkaz, Nekrasova str., 7. Tel. +7 (8672) 53-09-76.
Ministry for Civil Defence, Emergencies and Elimination of Natural Disasters Implications.
Vladikavkaz, Iristonskaya str., 25. +7 (8672) 74-95-23.
National Cultural Societies:
All-Ossetia's Society "Styr Mykhas". Vladikavkaz, Mira prosp., 25. Tel. +7 (8672)33-99-18.
Azerbaijan "Azerit". Vladikavkaz, Gen. Plieva str., 28. Tel. +7 (8672) 75-71-22.
Armenian Charity Society "Nairi". Vladikavkaz, Kotsoeva str., 9.
Greek Society "Prometeus". Vladikavkaz, Nalchinskaya str., 12. Tel. +7 (8672) 75-81-53.
Georgian Society "Ertoba". Vladikavkaz, Tseretelli str., 12.
Jewish "Sholom". Vladikavkaz, Mira prosp., 25. Tel. +7 (8672) 33-26-56.
German Cultural Centre. Vladikavkaz, Kotsoeva str., 43.
Terskoe Cossack Society. Vladikavkaz, Mira prosp., 34. Tel. +7 (8672) 33-13-00.

Ingushetia

State Committee on Natural Resources (Chairman, Tadaboriev H.M.)
366700, Ingushskaya Republic, Sunjensky raion, Orjonekidzenskaya village,

Lenin str., 83. Tel.: (87144) 2-11-69.

State Committee on Forestry (Chairman, Sultygov M.A.)
366700, Ingushskaya Republic, Sunjensky raion, Orjonekidzenskaya village, Goscomleshoz. Tel.: (87144) 2-11-50.

State Committee on Environment Protection (Chairman, Barkinhoev B.U.-G.)
366720, Ingushskaya Republic, Nazran, Akhriteva str., 13. Tel: (87144) 2-31-31.

Committee on Land Resources and Land Improvement (Chairman, Morziev T.U.)
366720, Ingushskaya Republic, Nazran. Tel: (87144) 2-41-69, 2-30-98.

Tchechnia

Mission of the Tchechen Republic in the Russian Federation (Khassanov V.S.)
121002, Moscow, Denejny per., 12. Tel.: (095) 241-03-59, fax (095) 241-73-80.

Tchechnia Representative with the RF President in Moscow.
Tel: (095) 292-04-38.

Tchecheno-Ingushsky affiliate of SevKavNIIgyprozem.
364051, Grozny, Liaindevsky str., 11, Tel. (by order) 7-30-79).

Stavropolsky kray

Committee on Natural Resources of Stavropolsky kray (Chairman, Raspopov Y.V.)
355003, Stavropol, Lva Tolstogo str., 42. Fax: (8652) 35-59-40, tel.: 35-53-20.

Stavropol Forest Authority (Director, Popovichev V.V.)
355038, Stavropol, "Stolbic" check-point. Tel.: (8652) 94-41-99, fax: (8652) 94.40-16.

Committee on Land Resources and Land Improvement (Chairman, Simbirev N.F.)
355106, Stavropol, Mira str, 337. Tel.: (8652) 35-25-87.

Stavropol Centre on Hydro-meteorology and Monitoring of Environment (Director, Potopaeva R.A.)
355012, Stavropol, Oktiabrskoi revolutsii str, 6, P.O.Box 60. Tel: (8652) 35-23-90.

Protected Environmental Region of the Caucasian Mineral Waters (Deputy Head, Svetlana Liashchenko)
Tel: (99532) 943197; Fax: (99532) 001153

State Committee on Environment Protection (Chairman, Yakovlev N.P.)
355000, Stavropol, Lenina str, 480, korp. 3. Tel: (8652) 76-24-84, fax (8652) 76-24-84. E-mail: sgpi.stvpl@rex.iasnet.ru

North Caucasus Regional Geological Centre (Director, Sharafan V.Y.)
357600, Stavropolsky kray, Essentuki, Sadovy per., 4a. E-mail: postmaster@geolog.stavropol.su. Fax/tel.: (86534) 7-46-47.
North Caucasus Centre on Environmental Studies (Director, Kuzmenko A.G.)
357600, Stavropolsky kray, Essentuki, Sadovy per., 4a. Fax: (86534) 7-42-36, tel.: 7-42-65.
North Caucasus Regional Monitoring Centre (Director, Melentieva N.M.)
357600, Stavropolsky kray, Essentuki, Sadovy per., 4a. Tel: (86534) 7-45-52.
North Caucasus Regional Informational Computer Centre (Director, Vedysheva T.A.)
357600, Stavropolsky kray, Essentuki, Sadovy per., 4a. Fax: (86534) 7-42-01, tel.: (86534) 7-45-17. E-mail: geolog@post.cmw.ru.
Kavminvodovskaya hydro-geological expedition (Director, Rubanov G.P.)
357441, Stavropolsky kray, Inozemtsevo village, Shosseinaya str., 207. Fax: (86532) 4-48-39, tel.: (86532) 2-92-43.
Stavropolsky State University
355009, Stavropol, Pushkina str., 1.
Analytical Centre "Nature"
357743, Kislovodsk, Moskovskaya str., 17. Tel.: (86537) 5-96-36.
Stavropolsky affiliate of KubanNIIgyprozem
355045, Stavropol, K. Marx prospect, 15. Tel: (86522) 5-85-61.
Stavropolsky affiliate of Vysokogorny Geographical Institute (Director, Ekba Y.A.)
355005, Stavropol, Abramovoi str., 2. Tel: (86522) 5-53-81.

Dagestan

Committee on Geology and the Use of Sub-Soils of Dagestan Republic (Chairman, Magomedov A.H.)
367020, Mahachkala, Tchernyshevskogo str., 115. Tel.:(8722) 63-23-93, fax: (8722)63-21-32.
Committee on Water Resources (Chairman, Aliev A.Y.)
367027, Mahachkala, Tchernyshevskogo str, 115. Tel: (8722) 64-47-63.
Western Caucasus Basin Water Resources Authority (Director, Saipulaev I.M.)
367025, Mahachkala, Gadjieva str, 26. Tel.: (8722) 67-06-193, fax: (8722) 64-49-21.
Committee on Forestry of Dagestan Republic (Chairman, Biarslanov M.-S.B.)
367010, Mahachkala, Gagarina str, 51. Tel.: (8722) 62-40-38.
Committee on Land Resources and Land Improvement (Chairman, Rushenko V.K.)
367012, Mahachkala, Markova str., 26. Tel: (8722) 67-19-06.
Dagestan Centre on Hydro-meteorology and Monitoring of the Environment

(Director, Postovik P.V.)
367012, Mahachkala, Maiachnaya str., 18. Tel.: (8722) 67-10-50.
Ministry of Environment and Natural Resources Protection of Dagestan Republic (Minister, Aliev N.-K.K.)
367000, Mahachkala, Ozernaya str., 17b. Tel.: (8722) 68-04-88, 68-04-73.
Dagestansky affiliate of SevKavNIIgyprozem
367005, Mahachkala, Kazbekova str., 157b. Tel.: (37222) 7-28-45.
Dagestansky State Pedagogical University
367003, Mahachkala, 26 Bakinskih komissarov str., 57.
Institute of Applied Ecology (Director, Abdurahmanov G.M.)
367003, Mahachkala, 26 Bakinskih komissarov str., 57. Tel: (8722) 68035-13.
Precaspian Institute of Biological Resources
367025, Mahachkala, M.Gadjieva, 45. Tel.: (8722) 67-38-56. Zalibekov Z.G.
Mountain Botanical Garden (Director, Magomedov-Mirzaev M.M.)
367025, Mahachkala, M.Gadjieva, 45. Tel: (8722) 67-68-36.
Dagestan reserve (Director, Magomedov G.M.)
367010, Dagestan Republic, Mahachkala, Gagarina str., 120. Tel.: (8722) 62085-07.

Appendix 2: Non-governmental organizations

Armenia

Eco-Club "TAPAN" (ARK) (Chairman, Hrant Sargsyan)
Activities: desertification; agriculture; forestry; protected natural areas; biodiversity; ecological training and education; journalism, mass media; ecological tourism; environmental law and policy.

Yerevan, 375114, S/W, district B-2, H-21, Apt.# 23; Tel (3742)-73-33-22; E-mail: <grant@tapan.infocom.amilink.net>;Address of Resource Centre: Yerevan, Zackiyan 8, Apt.# 35; Tel/Fax: (3742)-56-60-16; E-mail: tapan@acc.am.

Azerbaijan

Nature-conservation activists - users of electronic mail:
AZERBAIJAN <cenn_az@post.net.ge>
gulnara@project.baku.az - Children Union of Azerbaijan
51@mednet.org.az - Azerbaijan Ornythological Society
zoology@dcacs.ab.az - Azerbaijan Ornythological Society
ruzmk@rad.dl.ab.az - Ecological Society "Ruzgar"
irex@irex.org.az - Informational Analytical Ecological Agency "Ecores"
ngo@isar.baku.az - ISAR-Azerbaijan
Enver@isar.baku.az - ISAR-Azerbaijan
eldar@hrcentre.baku.az - Human Rights Centre of Azerbaijan
Eco@intrans.baku.az
craig@azeri.com - ISAR-Azerbaijan
ali@orientel.Baku.az - Azerbaijan Ornitological Society
IMustafaev@iatp.baku.az - Ecological Society "Ruzgar"
ssx@azun.baku.az
zaliha@hrcentre.baku.az - Initiative Group of "International Amnesty" in Azerbaijan
org@irex.baku.az - Informational Analytical Ecological Agency "Ecores"
guseynovafk@aznet.org - Azerbaijan Green Movement
elchin@isar.baku.az - Humanitarian Informational Analytical Agency "Saniya"
gamidzadeAE@aznet.org - youth green movement of Azerbaijan

Green Movement of Azerbaijan (Farida Guseinova, Musa Arsankaev)
370001, Baku–1, Istiglaelit str 31, 5-th floor. Tel. (89264) 5-69-51; 74-67-

80; (8922)39-93-63; 39-38-71. E-mail ngo@.isar.baku.az

ISAR, Office in Azerbaijan (Enver Safar-Zade, Telman Yolchiev)
370014, Baku, Sh.Azizbekov str., 23. Tel. 994 (12) 95-83-68 E-mail Enver@isar.baku.az; Telman@isar.baku.az; http://www.isar.org

Youth Ecocentre of the Green Movement of Azerbaijan (Ahmedago Gamid-Zade)
370001, Baku –1, Istiglaelit str 31. E-mail gamidzadeae@aznet.org

Ornithological Society of Azerbaijan (Elchin Sultanov)
Baku, proezd 1128, mahalla 504. Tel. (8922)92-70-52. E-mail: ali@oriental.baku.az, zoology@dcacs.ab.az

Children's Union of Azerbaijan (Fuad Dary-ogly)
Baku, Tavriz str, 10. : E-mail gulnara@projekt.baku.az

Working group on Ecological Issues of the Caspian Sea (Prof. Islam Mustafaev)
E-mail: ruzmk@rad.dl.ab.az

CAUCASUS (International public centre for studying local legislation and ecotourism "Caucasus "): a youth ecological organization striving to increase the ecological education of children and youth by establishing their contact with nature and ecological tourism. As a result of supporting ISAR-Azerbaijan, "Caucasus" has received many new textbooks and materials, constructive advice which catalyzed organization's interesting ideas. The organization plans to put these ideas into practice step by step. "Caucasus" has about 30 activists, 20 of whom work on voluntary basis. The main goal of the organization is to attract the attention of public at large and international organizations to issues related to nature, culture, and traditions of the Caucasus region through ecological tourism.

E-mail ngo@isar.baku.az (SB. For Elchin Orujev). Tel.(8922) 71-24-68. Contact: Elchin Orujev.

ECORES - INFORMATIONAL AND ANALYTIC ENVIRONMENTAL AGENCY – an independent non-governmental informational and analytic ecological organization established in Baku in 1995. ECORES deals with analyses of the ecological situation in Azerbaijan with the main objective of informing the general public about the situation of the environment and natural resources in Azerbaijan and abroad. ECORES also concerns itself with international experience in solving environmental problems in industrialized countries and makes every effort to contribute to the local use of such experience.

E-mail Irex@irex.org.az 370002 Baku, Samed Vargan str, 83, tel. (99412)317881, 951231; fax (00412) 98318. Contact: Shahim Panahov, Sevil Guseinova.

Youth ecotourism group "Pilgrim" is a non-governmental voluntary group working in Azerbaijan on the development of ecotourism and youth ecological movements. Established in 1998, "Pilgrim" brings together enthusiasts, experienced instructors in tourism and alpine mountaineering, and nature advocates involved in ecotourism development and practical environmental protection activities. There are about 30 members, most of whom are members of the Alpine Mountaineers Tourist Club of Azerbaijan. Activities focus on: popularization and development of ecotourism, youth ecological movement; attracting youth and adolescents to socially-useful activities related to nature protection; promotion of their new environmental awareness based on harmonization of relations between the society and nature.

Valuyev Yuriy Aleksandrovich (Head of "Pilgrim"). Tel: (99412) or (8922) 40-58-19; E-mail: ShabanovaCM@aznet.org

Ecological Society "Ruzgar" is a non-governmental, non-political and non-profit organization of Azerbaijan, established in 1996 by scientists, engineers, doctors, sociologists, lawyers, economists, and journalists engaged in various fields of environmental protection. The main aims of the Society consist of public monitoring of the ecological situation, organization of civil activities for the protection and improvement of environment and ecological education of the country's population.

E-mail: Ruzm@rad.dl.ab.az , 370143, Baku, Javidapr-t, 31-à, tel. (994-12) 76980, fax (994-12) 769801. Contact: Islam Mustafaev

Humanitarian Information Analytical Agency "Saniya" is the only non-profit, volunteer agency which focuses all its informational-analytical work in the field of humanitarian and social issues. One of the most important directions of the work is learning and informing the "population of social problems such as human health and environment.

Baku, 80, Zardabi str., room 1, 5-th floor. Tel: (99412) or (8922) 93-26-11, 71-04-28 E-mail: ngo@isar.baku.az. Contact: Aida Dadasheva

Youth Ecological Centre "Yashil Dalga" (Green Wave) is an ecological centre with a goal of informing society of the environmental problems of Azerbaijan through the mass media. "Yashil Dalga" has a Board, experts, lawyer, and six activists. It is a young organization composed of young, resourceful members concerned with environmental situation in Azerbaijan. Staff members of have graduated from management courses organized by ISAR-Azerbaijan, participated in joint training, seminars and conferences in Azerbaijan and Georgia conducted by ISAR-Azerbaijan and Horizonti Foundation.

41-2 V, Chobanzade Str., Baku, Azerbaijan. Tel: (99412) or (8922) 76-27-38 E-mail: ngo@isar.baku.az. Head of YEC "Yashil Dalga": Salman Suleymanov

Georgia

There is a database of more than 3,000 Georgian NGOs on the website http://www.itic.org.ge The most active NGOs with regard to the protection of mountain ecosystems are listed below.

NACRES (Noah's Ark for protection of endangered species (Chairman, Jason Badridze)
Tel/fax: (99532) 225791.
Georgian Wildlife Foundation (Chairman Mr. Ramaz Gokhelashvili)
Tel: (99532) 307352.
Sustainable Tourism Centre (STC)/Caucasian Mountain Network (Director, Vano Vashakmadze)
Tel/fax: (99532) 996304; E-mail: stc@ip.osgf.ge
Centre for facilitating sustainable development of alpine regions in Georgia (Director, Koba Arabuli)
International Telecommunication and Information Centre ITIC; Information service and training centre for Environmental NGOs (Director, Valeri Nanobashvili)
E-mail: vn@access.sanet.ge
WWF Country Office in Georgia (Director, Gogi Sanadiradze)
Tel:(99532) 997261 / 998150; E-mail: gsanadiradze@wwfgeo.org.ge
Horizonti Foundation (former ISAR US AID)
Tel:(99532) 933067 ; Fax: (99532) 987504

Russian Federation

Adygeia and Karatchaevo-Tcherkesskaya Republics and Krasnodar kray

The Social and Ecological Union of the Western Caucasus (Co-chairmen: V. Fedorovich (Krasnodar), A. Rudomaha (Maikop), V. Timoshenko (Novorossiisk)
352700, Maikop, P.O. Box 73, Tel.: (87722) 3-34-14, e-mail: ies@mail.ru
Kubanskaya Peoples Academy (Director, Molokanov G.I.)
350007, Krasnodar, Zaharova str., 41-24, Tel: (8612) 68-97-46
Azovo-Black Sea NPO Network (National coordinator: Pankova S.A.)

353410, Krasnodarsky kray, Anapa, I. Golubtsa str., 13, Tel: (86133) 5-62-69, e-mail: <ekurs@krintel.ru>

Independent Ecological Service for the North-Western Caucasus (Director, Rudomaha A.V.)
352700, Maikop, P.O. Box 73, Tel: (87722) 3-34-14, e-mail: ies@mail.ru

"Ecological Boomerang" (Fedorovich V.V.)
350039, Krasnodar, P.O. Box 5269, Tel.: (8612) 51-35-96

Emergency Ecological Aid "Ecomir" (Pelihova E.I.)
350078, Krasnodar, P.O. Box 1226, Tel: (8612) 54-93-32

Public Ecological Chamber (Amelin V.P.)
350000, Krasnodar, Krasnaya str., 143, Tel.: (8612) 55-60-02

Kubansky Ecological Union (Mamulov F.G.)
350020, Krasnodar, Krasnaya str., 180-408, Tel: (8612) 57-65-68, 33-93-48

Krasnodarsky kray VOOP Organization (Sergeeva M.A.)
Krasnodar, Oktiabrskaya str., 21, Tel: (8612) 55-75-50, 68-67-88

"EFOS" (Krasnodarsky kray Public Fund of Falcon Protection) (Mnatsekanov R.A.)
350080, Krasnodar, P.O.Box 1708, Tel: (8612) 33-26-36

Centre of Physicists Ecologists "Color Glasses" (Suiatin B.D.)
350058, Krasnodar, P.O.Box 4308, Tel.: (8612) 33-73-62, 33-44-75

Animal Protection Club (Pankratova S.S.)
350000, Krasnodar, Rashpilevskaya str., 127, Tel: (8612) 57-35-07, 59-34-65

Black Sea Environment Protection Society (Karakezidi I.V.)
353900, Krasnodarsky kray, Novorossiisk, Admiral Serebryakov quay, water station, Tel: (8617) 3-30-56, e-mail:<BSEco@ntpp.kuban.ru>

"Green" (Galkina G.V.)
353915, Krasnodarsky kray, Novorossiisk, 1905 Revolution str., 21, Apt. 57, Tel: (8617) 25-75-91

"Aquatoria" (Timoshenko V.G.)
353900, Krasnodarsky kray, Novorossiisk, Dzerjinskogo str., 138, Apt. 59, Tel: (8617) 3-31-25, 3-82-32, e-mail:<aqua@nross.kuban.ru>

"Aqua" (Tribrat T.G.)
353900, Krasnodarsky kray, Novorossiisk, K. Marx str., 2-32, Tel: (8617) 25-26-13, E-mail:<tribrat@nross.kuban.ru>

"Ecurs" (Pankova S.A.)
353410, Krasnodarsky kray, Anapa, I. Golubtsa str., 13, Tel: (86133) 5-62-69, e-mail: <ekurs@krintel.ru>

Black Sea Social and Ecological Centre (Soloviev V.V.)
353470, Krasnodarsky kray, Gelenjik, Lenina str., 23, Tel: (86141) 2-88-07

"Public Ecological Expertise" (Osicheva M.M.)
353470, Krasnodarsky kray, Gelenjik, Morskaya str., 26-17, Tel: (86141) 2-39-52

Committee of Public Supervision and Promotion (Chairman, Tchernovol V.P.)
352800, Krasnodarsky kray, Tuapse, Maiakovskogo str., 9-11, Tel.: (86167) 2-88-07

Sochi affiliate of the Russian Geographic Society (Didenko N.V.)
354024, Krasnodarsky kray, Sochi, Kurortny prospect, 113, Tel: (8622) 97-00-07

Ecological Centre Sochi/ECOS (Zagorsky E.P.)
354000, Krasnodarsky kray, Sochi, Navaginskaya str., 12, Apt. 56, Tel.: (8622) 92-95-29, e-mail: ecos@chat.ru

"Green Lightning" (Simonov S.L.)
354065, Krasnodarsky kray, Sochi, P.O.Box 135

Sochi city VOOP organization (Kutenova M.P.)
354068, Krasnodarsky kray, Sochi, Donskaya str., 98A-53, Tel: (8622) 93-73-27

Children Ecological Organization "Arc" (Tokmakova I.M.)
352671, Krasnodarsky kray, Apsheronsky raion, Khadyjensk, Lenina str., 57, Tel.: 7-17-62

"Taman Zapovednaya" (Ponomareva V.P.)
353531, Krasnodarsky kray, Temruksky raion, Volna village, Tamanskaya str., 14-2, Tel.: 7-66-73

"Ecoinform" (Loginov V.S.)
352400, Krasnodarsky kray, Kurganinsk, Sadovaya str., 107, Tel.: (86147) 2-12-05, e-mail: <loginov@ecoinf.kurg.kuban.ru>

"Biokom" (Akexandrova N.N.)
352510, Krasnodarsky kray, Labinsk, Mira str., 167, Tel.: (86169) 2-25-46

"Rodnik" (Slobodskoi I.M.)
352100, Krasnodarsky kray, Lermontova str., 27

"EcoNOM" (Karataev V.I.)
352018, Maikop, Unnatov str., 2J-4, Tel.: (87722) 1-73-96

Ecological Community Association "Atshy" (Bolotnikov D.V.)
e-mail:<atshy@mail.ru>

South-Russian Resource Centre
E-mail: rubass@online.ru. 350058, Krasnodar, Starokubanskaya str., 114, 5th floor. Tel.: (8612) 31-90-20, 31-91-44. Fax: (8612) 31-09-89.

Kabardino-Balkaria

Ecological group established at newspaper "Aura" editing office
E-mail: aura@aura.nalchic.su. 360030, Nalchik-30, P.O.Box 10. Tel: (86622)7-04-56,7-21-72.

Republican Ecological and Biological Centre (Andreeva Olga)
360009, Kabardino-Balkarskaya Republic, Nalchik, Dagestanskaya str., 105. Tel.: office (86622) 5-08-40, home 7-22-91.

Kabardino-Balkarsky Ecological Centre (Zalihanov M.T.)
360030, Nalchik, Lenina prosp., 2.

Northern Ossetia-Alania

"Vestnik Vladikavkaza" (Burnatsev S.A.)
Vatutina str., 17, Vladikavkaz, Tel. 33-80-70
Iraf(Maliev V.G.)
Mira prosp., 25, Vladikavkaz, Tel. 33-14-32
Nogdzau (Dzasokhov M.G.)
Mira prosp., 25, Vladikavkaz, Tel. 33-31-37
Republican Centre of Children and Youth Tourism (Albegonov M.K.)
Yashina str., 11, Vladikavkaz, Tel. 33-32-62
Republican Association "Ardz" (Torchinov V.G.)
Gastello str., 67, Vladikavkaz, Tel. 75-74-80
Youth Ecoclub "Viola" (Bobyleva L.A.)
Vatutina str., 46, Vladikavkaz, Tel. 33-52-02
Association "Green House of Ossetia" (Khetagurov K.D.)
Nikitina str., 4, Vladikavkaz, Tel. 53-09-67
Nature Protection Society (Toguzov A.T.)
Kotsoeva str., 66, Vladikavkaz, Tel. 75-60-20
Office of the International Academy of Ecology and Human Safety (Alborov I.D.)
Nikolaeva str., 44, Vladikavkaz, Tel. 74-93-36

Ingushetia

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310002, Kharkov, Sumskaya str., 44/2, Apt. 5a. Tel.: 0572-47-49-98.
E-mail: pecheneg@pechen.kharkov.ua

Independent Ecological Service for the North-Western Caucasus (Director, Rudomaha A.V.)
352700, Maikop, P.O. Box 73, Tel.: (87722) 3-34-14, e-mail: ies@mail.ru

Tchechnia

"Tchechnia's children" Foundation (Gadaev M.S.)
Tel.: (095) 248-83-52, (095) 248-83-54.
Groznensky Oil Institute
Krasnyh frontovikov str., 8/70, Apt. 11. Gasriants.

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Stavropolsky kray

Stavropolsky Regional Centre of Continuous Ecological Education (Kornilov Nikolai)
355038, Stavropol, Lenina str., 480, kor. 1, Apt. 21. Tel.: (8652) 6-00-70, 76-14-10
Stavropolskaya Ornithological Group "Sokol"
Stavropol, 50th anniversary of VLKSM str., 51/4, Apt. 13.

Dagestan

Caucasus affiliate of Green Movement (S. Magidov)
367002, Dagestan Republic, Mahachkala, Oskar str., 60, Apt. 31.
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IUCN – The World Conservation Union

Founded in 1948, The World Conservation Union brings together States, government agencies and a diverse range of non-governmental organizations in a unique world partnership: over 900 members in all, spread across some 139 countries.

As a Union, IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

The World Conservation Union builds on the strengths of its members, networks and partners to enhance their capacity and to support global alliances to safeguard natural resources at local, regional and global levels.

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