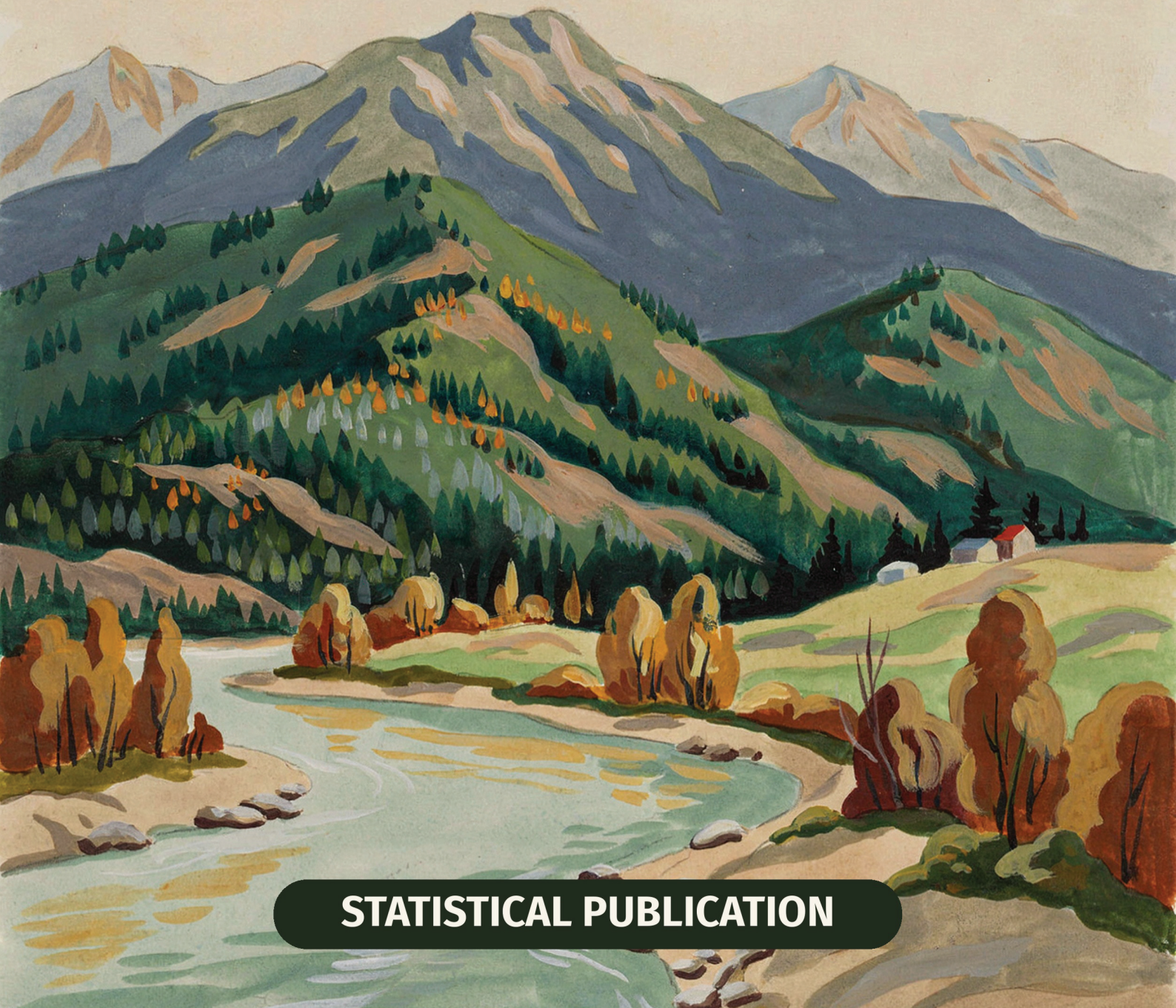
NATIONAL STATISTICS OFFICE OF GEORGIA

NATURAL RESOURCES OF GEORGIA AND ENVIRONMENTAL PROTECTION

2025



STATISTICAL PUBLICATION

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The data in this publication do not cover uccupied territories of Georgia (Autonomous Republic of Abkhazia and Tskhinvali region)

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Foreword

Statistical publication "Natural Resources and Environmental Protection of Georgia" presents information on the use of land, forest and water resources, ambient air protection, protected areas, natural disasters and environmental violations. It also includes methodological explanations and information from different reference and scientific sources.

The preparation of this publication is based on the growing interest of a wide range of users, however, the information collected in it, presents the best way of policy planning at local or global levels. In addition, the need to produce environmental indicators is related to the most important issues of global policy, such as climate change and environmental security.

The data in the publication reflects the natural resources of Georgia and developed trends of environmental activities in 1995-2024

Substantive comments and suggestions on the format and content of the publication will be highly appreciated by the group of authors.

This edition is designed for different groups of users.

National Statistics Office of Georgia

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Geographic Location and Natural Resources of Georgia

(Brief overview)

Georgia is located in the central and western part of the South Caucasus. Total length of the border of Georgia is 2 148 kilometres, out of these 1 839 kilometres on land and the total area of country is 69 700 km^2. To the west Georgia is bounded by the Black Sea – between the estuary of the river Psou and village Sarpi, to the north – by the Russian Federation, to the east – by Azerbaijan, to the south – by Armenia, and to the southwest - by Turkey. The extreme west and east borders go through eastern latitude 40°05' and 46°44', and north and south borders – through north longitude 41°07' and 43°35'.

Relief - The territory of Georgia is spread up vertically to 5 203 m from sea level (peak Shkhara). Georgia is distinguished with complexity of relief – about 2/3 of its territory is mountainous. Along the north border, more than 1/3 of the country area is occupied by the Caucasus Mountain System. The relief of Georgia is represented by high, medium and low mountains, uplands and plains. There are following principal orographic units in Georgia: the Caucasus Mountains, the intermountain plains divided by Likhi Ridge into Kolkheti and Iveria Valleys and Trialeti Ridges (part of the Small Caucasus Mountain System). Some of the peaks of the main watershed ridge of the Caucasus Mountains in Georgia are higher than 5 000 m.

Climate - Georgia is characterized by almost every climate zone existing on the earth, from humid subtropical climate to eternal snow and glaciers zone. Diversity of the climate in Georgia is determined by its location on the northern border of the subtropical zone between the Black and the Caspian Seas on the one hand and by complexity of its relief on the other hand. The ridges of various direction and height play an important role in climate formation.

A local climate is determined by the Caucasus Mountains which protects Georgia from cold air masses incursion and by the Black Sea which makes the temperature moderate and facilitates to greater precipitation. In Georgia, range of annual amount of precipitation is 400-4 500mm.

Due to its location on a relatively lower longitude and temperate cloudiness, Georgia receives a significant warmth from the sun. Average annual sunshine is 1 350–2 520 hours.

Mineral Resources - There are plenty of mineral resources available in Georgia; out of them the following have industrial importance: oil, coal, nonferrous and rare metals, mining and chemical raw materials, inert materials and other mines.

Ground waters - Ground waters (fresh, mineral and thermal) have a great importance in the mineral treasure of Georgia. They are very important for development of national economy of the country. Georgia's groundwater (freshwater) potential per capita is 2.5 times higher than that of the world. Ground waters are used as drinking water, for therapeutic purposes and as a source of thermal energy. There is a big amount of fresh ground water resources in Georgia and its total natural debit is 21.7 cubic kilometres (23% of the precipitation on the country territory). Its distribution is very non-homogeneous – it increases from the east to the west.

Georgia is also rich in thermal waters that can have a wide range of use in agriculture and energy sector.

Groundwater, for their salinity and temperature, are divided into groups:

- Fresh drinking water (salinity not more than 1.0 g/l);
- Thermal water – therapeutic (20-35°C), Heat-and-power (40-108°C);
- Mineral water (general salinity over 1.0 g/l).

Mineral waters - Mineral waters of Georgia are characterized by a great variety. There is a small amount of mineral waters with natural flow to the surface by following chemical structure: Carbon dioxide calcium hydrocarbonate, sodium-calcium hydrocarbonate, calcium hydrocarbonate-chloride-sulfate. A large part of the mineral waters flow through the boreholes. Their chemical composition is: sodium chloride, sodium calcite sulfate-chloride, sodium hydrocarbonate-chloride, etc.

Rivers - River network in Georgia is unequally distributed: out of 26 060 rivers with total length of about 60 000 km, 18 109 rivers are in Western Georgia, and 7 951 rivers – in Eastern Georgia. Length of 25 923 rivers is less than 25 km, of 121 rivers – about 25-100 km, and of 16 rivers – 100-500 km. The rivers of Georgia belong to the Black and the Caspian Sea basins. Almost all rivers of Eastern Georgia form the entire system of the Kura River and flow into the Caspian Sea, while the rivers of Western Georgia independently join the Black Sea.

The rivers of Georgia are fed by glaciers, snow, rain and ground waters. Water resources of Georgia are not equally distributed. Run-off of the rivers of Western Georgia (together with transit) compiles 49.8 cubic kilometres, and run-off of Eastern Georgia – 16.5 cubic kilometres. The most voluminous river is Rioni; Mtkvari is much less voluminous, its run-off near Georgian-Azerbaijan border is 8.3 cubic kilometres. The following rivers - Enguri, Kodori, Bzipi, Tskhenistskali, Kvirila, Liakhvi, Aragvi, Ktsia-Khrami, and Alazani - are worth mentioning as well.

Lakes - There are about 860 lakes in Georgia. Most of them are very small; therefore a total area of the lakes does not exceed 170 square kilometres (0.24% of the country territory). The lakes of Georgia are remarkable with their diverse origins. There are tectonic, glacier (most abundant), riverine, coastal, karst, sufozian, landslide and anthropogenic lakes. The majority of lakes in Georgia are fresh water, and part of them contains very little salt. In Georgia the largest lake by area is Lake Paravani, by volume – Lake Tabatskuri, by depth – Lake Ritsa, which is the deepest lake in the South Caucasus.

Reservoirs - There are 44 reservoirs on the territory of Georgia, their total area is 163 square kilometres, and the total volume of water is 3 315 million cubic metres.

There are 725 **glaciers** in Georgia and all of them are located in the Caucasus Mountains. Their cumulative area is 370 square kilometres that is 0.5% of the country territory.

Wetlands in Georgia are located on the Kolkheti Valley and their total area is 627 square kilometres. Georgia is bounded to the west by the Black Sea. The length of the coastline is 309 km. Within the territory of Georgia the following rivers flow into the Black Sea: Rioni, Bzipi, Kodori, Enguri, Tskhenistskali, Khobi, Kvirila, Supsa, Tekhura, Acharistskali, Psou, Dzirula, Abasha, Natanebi, Khanistskali, Okumi, Ghalidzga, Mokvi and Chorokhi. From the territory of Georgia up to 50 km^3 of water flows into the sea (16% of whole continental runoff).

The amount of precipitation is large during all seasons; South part of Kolkheti is especially rainy, where the annual precipitation is more than 2 500 mm.

An average value of surface layer salinity of water in an open sea fluctuates from 17.8$^0/_{00}$ (in spring) to 18.3$^0/_{00}$ (in winter). From the surface to the depth of 200 metres the salinity increases up to 21.3$^0/_{00}$. Rivers of Georgia make the sea significantly fresher near the coast, especially in spring and in the first half of summer. However, water stays salty beyond 3-6 km from the coast, only during large floods in the rivers it covers relatively large space, and salinity decreases up to 12-8$^0/_{00}$ in a short time.

Near the Black Sea coast in Georgia, the ichthyofauna consists of mainly sea fish, which live here permanently.

Soil - Due to the diversity of natural conditions, we can find almost all types of soil in Georgia. There are three soil provinces: West, East and South. By the conditions and processes of soil formation, in each of them different zones and subzones are distinguished and within the latter – regions and subregions. There are 48 soil regions and 169 subregions in Georgia.

Soil vegetation in Georgia is very diverse: Polydominant Colchis forest on red and yellow soils; alder forest in Kolkheti peat swamp; broadleaf and coniferous forest; highland meadows on the same ridge; eternal snow and glaciers on the main watershed ridge of the Caucasus; forest steppe and steppe landscapes in Eastern Georgia and mountain steppes with black soil (chernozems) in the highlands of Southern Georgia.

Soil Region of Western Georgia — is located from the Black Sea coast to the Likhi Range. The region is divided into zones of lowland marshy and podzolic (ezeri), hilly-hummocky foothill red earth (tsitelmits'a) and yellow earth (qvit'elmis'a), mountain-forest, and mountain-meadow soils. Due to the varying elevations of the Kolkhida Lowland, marshy soils are found in its western, lower-lying part, while podzolic (ezeri) soils are found in the eastern, elevated part. Among the lowland marshy soils, marsh peaty and marsh muddy soils occupy the largest area. The composition of the peat mainly involves herbaceous vegetation. Mossy marshes are less common. In isolated areas, peat layers of 6-7 meters thickness are found. Towards the elevated parts of the lowland (in the transitional zone), podzolic-gley soils are found, which are waterlogged in the middle and lower layers, and show clear signs of podzolization in the upper layers.

Red Earth and Yellow Earth soils occupy the hilly-hummocky zone of Western Georgia. The main soil type in this zone is Red Earth (tsitelmits'a). Their main properties are related to the strong weathering of rocks. Leached Red Earths (gaets'rebuli tsitelmits'ebi) are found on relatively gentle slopes and broad hilltops. Yellow Earth (qvit'elmis'a) soils, which are spread on conglomerates and clay shales, are mainly found in Abkhazia, Okriba, and Vani district.

The Mountain-Forest Zone of Western Georgia covers a large territory in the middle mountain belt. The main type of mountain-forest soil is Brown Forest Soil (qomrali niadagi). The Mountain-Meadow Soil Zone of Western Georgia includes subalpine and alpine meadows. It covers a large area in Abkhazia, Samegrelo, Svaneti, and Upper Imereti; relatively less on the Meskheti Range, and even less on the Shavsheti and Arsiani Ranges.

Soil Region of Eastern Georgia — covers the side of plains, foothills, and mountains from the Likhi Range eastward. Chestnut (ts'abla) and Chernozem (shavmits'a) soils occupy the steppe zone. Cinnamon (mura) soils are spread in the Eldari semi-desert and in some places in the southern part of the Iori Upland.

Chestnut soils are spread across the Gardabani, Marneuli, Samgori steppes, and the southern part of the Iori Upland. Chernozem soils occupy the most elevated part of the Iori Upland. Chernozems are characterized by a thick humic layer and a high humus content.

The Transitional Forest-Steppe and Forest Soil Zone of the Plains and Foothills of Eastern Georgia includes the Kartli and Alazani plains and the Iori Upland. Here, meadow-brown, chernozem-like, meadow alluvial, alluvial-waterlogged, meadow marshy, brown, and other soils are spread. The Mountain-Forest Zone of Eastern Georgia occupies a large area on the Caucasus, Trialeti, and Loki Ranges.

Soil Region of Southern Georgia — covers the uplands, ranges, and others of Southern Georgia. The main soils spread in this region are Mountain Chernozems, located at 1500-2200 meters above sea level, and Meadow Chernozem-like soils, which occupy a large area on the Javakheti, Tsalka, Gomareti, and Dmanisi uplands and plains. Brown Forest Soils are spread within the mountain-forest zone of the region.

Flora - Due to diversity of physical-geographic and climatic conditions, the flora of Georgia is very rich and diverse. Diversification of relief and complex configuration of mountain rings caused geographic and ecological isolation of ecosystems in Georgia and high level of local endemism.

In Georgia, there are up to 5 000 species of wild and vulnerable, hidden and naked seed plants, up to 8 300 spore plants (about 75 species of ferns, 600 species of moss, 600 species of lichen, 5 000 species of mushrooms, 2 000 species of algae, etc.).

Some species that became extinct in the rest of Western Eurasia million years ago are still preserved in Georgia. In particular, in Kolkheti we can still find Caucasian birch, Pontine oak, Kolkheti ivy, Cranberry, Cherry laurel, etc.

The substantial difference in the climate of the East and West Georgia provided the distinction of their vegetation that is reflected in the structure of vertical belt. In the Western Georgia there is no semi-arid and arid belt without forest. The flat areas, slopes and foothills are covered with forests from the sea shore. Compared with Eastern Georgia, the landscapes of subnival vegetation are less expressed here, accordingly in Western Georgia there are only 5 main belts: forest (1 900 m above sea level); subalpine (1 900-2 500 m); alpine (2 500-3 000 m); subnival (3 000-3 600 m) and nival (3 100 m and above).

In Eastern Georgia there are 6 main belts: semi deserts, dry fields and low density forests (arid light woodlands) (150-600 m); forest (600-1 900 m); subalpine (1 900-2 500 m); alpine (2 500-3 000 m); subnival (3 000-3500 m) and nival (3 500 m and above). Vegetation of mountain fields prevails in the mountainous forest and subalpine belts of Southern Georgia, where the vegetation of the mountain fields are mainly presented.

Fauna - There is a rich and diverse fauna in Georgia, mainly represented by the elements of sub district of Mediterranean Sea of Pale arctic district, but in north part of the country the representatives of European and Siberian sub districts are also frequently met, while in south east district – species of Central Asian sub district fauna or others similar to them.

There are around 100 mammal species, more than 330 bird species, about 48 reptile species, 11 amphibian species, and 160 fish species known in Georgia. Thousands of invertebrate species are met, but an exact number is not determined yet. Animals are distributed by zones, but the species with a great ecologic valence inhabit in several zones.

Landscapes - There are various types of natural-territorial complexes (landscapes) in Georgia, including semi-deserts (Eastern Georgia), Kolkheti humid subtropics (Western Georgia) and nival-glacial landscapes as well. Here, as in a mostly mountainous country, variation of natural components by altitude and accordingly, altitudinal zonation with the full spectrum of landscape zones are well represented. Herewith, various types of natural-territorial complexes, typical for flat lowlands and small mountain areas of humid, moderately humid and dry subtropics, are developed in the valleys and lowlands between the mountains. More than 100 types (type, sub-type, form) of landscape are spread on the territory of Georgia.

The idea about necessity of nature protection in Georgia was formed in ancient past followed by a gradual development of legal norms. Old Georgian sources provide interesting information concerning a legal protection of single objects of nature. “The forest guards” are mentioned in the Book of King Tamar, dated 1189, and “the senior guardians” are mentioned even earlier in 1078. Norms regulating the use of water and pastures are provided in the document of the XVIII century (“Dasturmali”). One of the articles of this document protects hawks’ and peregrines’ nests. King Vakhtang’s Book of Laws also takes into account protecting water, forest and pastures. In Ioane Bagrationi’s Book of Laws (the project of public reforms in Kartl-Kakheti Kingdom, XVIII c.) the following is mentioned: “there should be a person responsible for hunting forests and fields; nobody can hunt in the royal hunting lands without their permission”. Hunting was prohibited in a reproduction period of birds and animals.

Definition of terms

Atmosphere	The gaseous mass or envelope surrounding the earth or any other celestial body.
Climate	The meteorological conditions, including temperature, precipitation, and wind that characteristically prevail in a particular region.
Debit	Amount of liquid or gas, which is generated by the source in a given amount of time.
Ecology	A natural science that studies the interactions between humans and nature, as well as the technical and economic aspects of these processes.
Endemic	A plant or animal peculiar to a particular geographic area.
Fauna	Animal life. Animals, characteristic of a region, period, or special environment.
Flora	All the plants that live in a particular area, time, period, or environment.
Hydrosphere	The aqueous envelope of the earth (oceans, seas, lakes, rivers).
Meteorite	A stony or metallic mass of matter that has fallen to the earth surface from cosmic space.
Mile	A unit of length, employed mainly for marine navigation. The International Nautical Mile equals to 1.85 km.
Phitocenosis	Unity of such plants that grow together and have close relations with one another and environment. A plant community.
Photosynthesis	The process by which a green plant turns water and carbon dioxide into food when the plant is exposed to light.
Promile, $^{0}/_{00}$	A tenth of a percent or one part per thousands.
Radiation	Emission of electromagnetic energy by a particular body.

1. LAND RESOURCES



Land resources play an important role in human life and activities. While using the land, man uses its chemical, physical and biological features. Thus, final result of the land cultivation – harvest - depends on thickness of the fertile layer, its mechanical composition, availability of chemical substances, i.e. soil fertility. Land represents the territorial-spatial basis in industrial activities (except the mining industry), in construction and infrastructure sectors.

Land is one of the main national wealth that needs special care and protection; almost half of natural wealth of Georgia counts on soil.

Georgia is a highland country. Lowland zone covers only 46% of the country territory. The land resources are characterized by a high level of agricultural utilization and high natural fertility of arable lands. Territorial distribution of lands in Georgia, similarly to other components, is subject to the rule on vertical zoning:

I zone (up to 250 m above sea level) – mainly characterized by subtropical cultures of Western Georgia.

II zone (250-500 m) – area of horticulture, viticulture, market-gardening and intensive field activities (mainly maize).

III zone (500-1 000 m) – dominates cereals, arable lands, and animal husbandry.

IV zone (1 000-1 500 m) - grasslands; field activities are weakly developed;

V zone (1 500-2 000 m) – mainly grasslands.

VI zone (above 2 000 m) – agriculture does not exist.

The territory of Georgia can be divided into three parts according to utilization types:

1. Agricultural land – 15.8%;
2. Natural – farming area (forest, shrubbery, hay pastures) – 70.6%;
3. Land not used in agriculture – 13.6%.

Agricultural land is subject to permanent changes in structure and quality, determined by cultivating new areas, intensive melioration activities, and others. Moreover, erosion processes, land salinity or bogging or flooding and other unfavourable conditions cause decreasing the size of agricultural land and worsening its quality. Thus, land resources are under permanent quantitative and qualitative changes.

Table 1.1. Sown area of agricultural crops

(thousand hectares)

	2018	2019	2020	2021	2022	2023	2024	2025
Sown area, total	**207.1**	**203.0**	**209.9**	**211.8**	**215.7**	**203.8**	**191.5**	**191.5**
Grain and leguminous crops	153.3	152.4	161.5	164.8	167.4	160.1	152.1	151.3
Potato, vegetables and melons	34.3	32.1	31.5	30.8	29.7	27.8	25.7	26.9
Other crops	19.6	18.5	16.9	16.2	18.7	15.9	13.8	13.3

Source: National Statistics Office of Georgia.

Table 1.2. Agricultural land operated by agricultural holdings according to land use type

(on October 1, 2024, hectare)

	Agricultural land	Arable land	Land under permanent crops	Greenhouses	Natural meadows and pastures
Georgia	**809 074**	**325 205**	**175 990**	**2 296**	**305 583**
Tbilisi	1 879	1 407	268	7	198
Adjara AR	18 167	4 572	10 302	42	3 251
Guria	26 742	9 978	15 465	21	1 277
Imereti	59 320	39 439	12 565	564	6 751
Kakheti	327 460	118 920	73 159	375	135 005
Mtskheta-Mtianeti	14 263	7 676	1 750	49	4 788
Racha-Lechkhumi and Kvemo Svaneti	7 038	2 628	1 422	7	2 982
Samegrelo-Zemo Svaneti	70 835	29 937	38 702	85	2 112
Samtskhe-Javakheti	88 517	28 116	487	134	59 781
Kvemo Kartli	133 289	45 521	5 884	904	80 979
Shida Kartli	61 563	37 010	15 986	109	8 458

Source: National Statistics Office of Georgia.
Agricultural Census of Georgia 2024.

Table 1.3. Non-agricultural land operated by agricultural holdings and its structure

(on October 1, 2024, Hectare)

	Non-agricultural land	Buildings and yards	Woodland	Reservoirs for aquaculture	Other non-agricultural land
Georgia	**58 155**	**46 268**	**4 187**	**2 810**	**4 890**
Tbilisi	706	460	9	0	237
Adjara AR	6 711	6 098	427	4	182
Guria	3 155	2 210	664	65	216
Imereti	9 819	7 834	1 214	136	634
Kakheti	10 584	7 795	133	1 753	903
Mtskheta-Mtianeti	6 919	6 480	39	10	390
Racha-Lechkhumi and Kvemo Svaneti	959	754	97	1	107
Samegrelo-Zemo Svaneti	7 741	5 794	1 362	269	316
Samtskhe-Javakheti	2 487	2 002	35	230	220
Kvemo Kartli	6 485	5 076	95	204	1 109
Shida Kartli	2 590	1 764	112	137	577

Source: National Statistics Office of Georgia.
Agricultural Census of Georgia 2024.

2. FOREST RESOURCES AND ITS PROTECTION



Forest is one of the important components of the biosphere. Forest area is about 4.0 billion hectares in the world, i.e. almost 1/3 of the total land cover. World reserve of wood is around 360 billion cubic metres, and annual growth – 3 200 million cubic metres. There are about 30 000 species of timber and shrubs, and thousands of bird and animal species. According to modern understanding, forest is a part of geographic landscape, unity of trees, bushes, grass, animals, birds and microorganisms which are biologically interconnected in the process of their development and affect one another and environment.

A quantitative accumulation of wood species creates new qualitative features in a forest. This ecological complex has significant and versatile impact on the environment. A forest differs from parks and gardens since the trees in a forest create a specific functional interconnections. On the other hand, the forest can belong to the community of any woody plants that has noted characteristics, regardless of origin, composition of tree species and location.

There are several tiers in a forest that are developed according to the species composition, the biological features of the basic plants, their age and the particular physical geographic conditions. In complex forests of moderate zone the following tiers are identified: the first one consists of trees that develop first value forest (pine, spruce, fur, beech, oak, etc.); the second one is developed by second value trees (lime, maple, hornbeam, elm, etc.); the third or under wood one is composed by bushes (nut, cornel, hawthorn, etc.); the fourth and fifth ones consist of grass and moss cover. One can meet climbing plants and mosses, mushrooms and algae (so called - epiphytes) on the branches in the different tiers of forest.

Forests become non-homogenous on a relatively big territory. Forests differ by species composition (pure – of one species or mixed – composed with several species), form (simple – one tier and complex – multi tier), age (one aged and various aged), origin (seeds and vegetation), frequency, productivity, etc.

The species composition and ecological features of forest vegetation change sharply according to the geographic longitudes, i.e. horizontal zones.

Georgia is a highland country, thus almost all forest (97.7%) are located on the mountain slopes. In Western Georgia forests begin from sea level and cover lowlands and foothill slopes up to 500 m above sea level. In lowland swampy areas we meet willow, poplar in some places Imeretian oak, ash and beech. Elevated places and foothills are covered by Colchis forests. In under wood rhododendron, bilberry, etc. are growing. There are lots of climbing plants as well.

On lowlands and foothill slopes of dry regions of Eastern Georgia (Shiraki, Eldari, Mtskheta, etc.), up to 400 -600 m above sea level light forests are spread, mostly composed of Georgian maple, pomegranate, pistacia, juniperus, etc. In lower zone of mountains (from 500 m to 900-1 000 m) there are oak and chestnut forests. Chestnuts are met in both Eastern (Kakheti) and Western Georgia. On lime soils of Western Georgia and dry districts of Eastern Georgia (Kartli, Gare Kakheti) oaks and hornbeams are spread instead of chestnuts. Medlar, hawthorn, cornel, nuts, sumach, etc. grow in lower zone of mountains. In middle zone of mountains (from 900 m-1 000 m to 1 500 m-1 600 m) beech is growing in some cases purely and in some cases mixed with hornbeam, field maple, lime, spruce, etc.

In Georgia one cannot find the beech zone only in Samtskhe-Javakheti, here it is replaced by spruce, fir and pine. High zone of mountain is represented by dark coniferous forests. In Western Georgia it begins from 1 400 m and often reaches high margin of forest distribution, in Eastern Georgia it extends from 1 500 metres to 2 100 metres. These forests are composed with the Eastern spruce and Caucasian fir, that form multi aged, highly productive, diverse pure and mixed zones. Beeches, elms, limes as well as pines are also growing here. Great number of pines is also distributed in the mountainous part of Tusheti, Meskheti and Trialeti ridge. In the districts where there are no spruces and firs (Gare and Shida Kakheti) beeches are spread. Upper zone of mountain (from 1 900 m -2 100 m to 2 400 m) is covered by subalpine forests. Crooked forests that are spread in all districts are mainly presented by birches and beeches. Subalpine light is more typical for Eastern Georgia and is composed with

highland maple, highland oak.

Forest is a global and vital factor for the entire ecological system of the earth. It is one of the live substance accumulators on our planet, as it retains a large amount of chemicals and water in the biosphere. A forest actively interrelates with the troposphere and determines the level of oxygen and carbon balance. Land vegetation and its main component – forest, provide more than 60% of the oxygen in the biosphere. One hectare mixed forest absorbs 13-17 tons of carbon dioxide and generates 10-15 tons of oxygen. Forest is the most productive formation of our planet and is characterised by the highest intensity of the biological circle. A biomass accumulated in the forest considerably exceeds the biomass of grass and other vegetations. Annual growth of one hectare forest phitomass is 10-30 tons on average, of vegetation – 9 tons and of tundra – 2 tons.

Forest has various functions: forest is a strong accumulator of the solar energy. It has a significant influence on climate formation, on water turnover in nature, and air circulation in the atmosphere; thus, forest ensures the conditions necessary for human life. The starting point of this circle is the process of photosynthesis that generates oxygen. While in 30-50s forest was generating just 30% of planet's oxygen, now forest provides 60% of biologically active oxygen, the rest is supplied by marine and oceanic plankton, and field and garden plants. Oxygen generated by a forest is qualitatively different from marine and ocean oxygen, since it is full of negative ions. This significantly increases biological features of forest, since a positive influence of negative ions on the human organism is proved by scientists. Ionization of forest oxygen is 2-3 times more than marine one and 5-10 times more than ionization of urban atmosphere.

Forest cleans the air from dust. One hectare forest filters 50-70 tons of dust annually, and consequently forests of Georgia filter about 135-190 million tons of dust.

Forest regulates intensity of snow melting, significantly reduces speed of air circulation and protects useful fauna and microorganisms. A lot of forest plants restrain disease-causing organisms and make the environment healthier. Forest is a powerful sanitary factor that ensures human life and health.

Water protecting function of forest is very important. It facilitates normal and equal supply of water to the rivers and other water resources (lakes, springs, etc.), prevents floods, improves water quality and protects it from pollution. The role of forest is also important for increasing the soil fertility and protecting it from water and wind erosion. A majority of the arable lands are located in unstable and insufficient humidity zones. A protective forest planting belongs to the activities directed against draught and erosion.

The forest provides many kinds of valuable products and raw materials. It is a place of diverse fauna. The recreational and tourist importance of the forest is great. Forest is distributed on all continents, except Antarctica. In the past times forest was spread over a larger area, part of which was later occupied by agricultural lands, cities and industrial complexes.

Forest is a source of many resources: timber, bark, branches, leaves, fruit, seeds, mushrooms, etc. It is widely used in industry, processing, chemical, food industry, pharmaceutical, textile and other sectors. Forest is one of the biological resources that have regeneration ability. It has biochemical function, participates in formation of diverse landscapes, has a great water preserving, soil protecting, climate regulating and sanitary hygienic importance; thus, protection of forest and its rational use has a great economic and vital importance.

The forest increment is a cambium layer of a tree that annually produces the sapwood ring. In any period of the growth of tree or stand of trees, a tree grows both in height and in diameter. This change is called increment. There are two types of forest increment: mean and current increment. Mean increment is defined by the annual variation of different taxation indicators (height, diameter, volume, stock, mortality etc.). I.e. absolute volume of taxation indicator divided by the age. Current increment is defined as a difference between the volume of taxation indicator today and several years (1-5 or 10 years) ago.

The main purpose of the forestry is meeting the demand for forest products of national economy and population, without exhausting the forest resources. This problem should be solved without reducing the forest area,

preserving forest productivity, and protecting its environmental, sanitary-hygienic and other useful characteristics. Forestry, as a production sector, has a peculiarity – a significantly long period of forest growth. One turnover of forestry takes as much time as necessary for 80-150 turnovers of agriculture. Changes in the forestry are basically unnoticeable for one generation.

Timber logging should be done carefully in order to encourage development of highly productive forests.

Lack of adequate road infrastructure hinders proper logging in Georgia. Road construction in mountainous regions is very expensive, thus agencies interested in a complex utilization of highland areas should cooperate.

Protecting forests from fire has a great ecological importance – fire destroys young trees and burns vegetation; this of course worsens physical-chemical, water preserving, and soil protecting features of soil. Danger of wind and water erosion also increases. In the past wildfire was quite frequent in Georgia and was spread on large areas. For example, there was a strong forest fire in 1884, named “Gujareti”. It covered 30 thousand hectares of forest from Tsaghvery-Bakuriani to ravine of the River Tana. The wildfire was active for several months, population of Kartli and the military forces were mobilized for its localization. Implementation of forestry activities is very important for fighting against forest fires. Fire brigades should be organized and properly equipped, public awareness should be improved concerning these issues.

According to the data from 2025, the area of Georgia's forest area is 3072.3 thousand hectares, which accounts for 44% of the country's territory. The largest area of the forest is located in the Autonomous Republic of Abkhazia, with 423.3 thousand hectares, followed by Kakheti region, with 288.1 thousand hectares. The majority of the state forest area is managed by the National Forestry Agency, which employs 1200 person.

Definition of terms used in tables

Forest	Part of geographic landscape which consists of trees, land, bushes, grass, animals and others that belong to forest according to legislation and that are biologically connected and have an impact on one another and on the environment.
Area covered by forest	A minimum area of land of 0.5 hectares and not less than 10 m in width, which is covered with one or more forest forming woody plant species and where the tree density is not less than 0.1 per unit area.
Forest restoration	Forestry related activity that aims at forest restoration on the areas of forest not covered by trees. Forest restoration activities include forest planting and seeding, as well as facilitating its natural recovery.
Facilitating natural recovery of forest	Set of activities that facilitate natural recovery of forest: fencing the forest areas with a purpose of protecting the trees from livestock grazing, treating natural growing, etc.
Forest area	Set of state forest, its land, forest under other types of ownership and their resources. Forest area consists of areas covered by forest and areas not covered by forest. The last includes fields, meadows, pastures, swamps, cliffs, glaciers, etc.
Timber felling	Removing trees and shrubs from natural environment of forest.
Illegal logging	Felling the trees without permission.
Operational expenses of the National Forestry Agency	Expenditures on operation of the National Forestry Agency, such as: forest arrangements, forest restoration, development of forest protection lines, protecting forest form fire, pests, diseases, etc. as well as expenses on the office of the agency.

Table 2.1. Forest area, 2025

(thousand hectares)

	Forest area
Forest area of Georgia	**3 072.3**
Forest area under the Abkhazia AR*	423.3
Forest area under the Forestry Agency of Adjara	149.5
Forest area under the Agency of Protected Areas**	588.7
Forest area under the National Forestry Agency***	1 910.8

*The data were evaluated by satellite observation as a result of spectral analysis.

*** Including Tskhinvali region.

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL Agency of Protected Areas.
LEPL Forestry Agency of Adjara.
LEPL National Forestry Agency.

Table 2.2. Forest area of Georgia by regions, 2025

(thousand hectares)

	Forest area	Of which covered by forest
Georgia	**3 072.3**	**2 814.7**
Forest Area of Abkhazia AR*	**423.3**	**423.3**
Forest area under the Forestry Agency of Adjara	**149.5**	**141.8**
Forest area under the Agency of Protected Areas**	**588.7**	**442.4**
Forest area under the National Forestry Agency***	**1 910.8**	**1 807.2**
Guria	71.5	68.6
Imereti	280.0	269.0
Kakheti	288.1	268.1
Mtskheta-Mtianeti	181.3	169.0
Racha-Lechkhumi and Kvemo Svaneti	268.1	254.6
Samegrelo-Zemo Svaneti	270.3	255.0
Samtskhe-Javakheti	121.6	117.1
Kvemo Kartli	145.6	131.7
Shida Kartli	284.3	274.1

*The data were evaluated by satellite observation as a result of spectral analysis.

*** Including Tskhinvali region.

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL Agency of Protected Areas.
LEPL Forestry Agency of Adjara.
LEPL National Forestry Agency.

Table 2.3. Area of Georgia covered by forest

Year	Area covered by forest*	
	Area, million hectares	Percentage share in the country land area
2016	2.69	38.7
2017	2.69	38.7
2018	2.68	38.6
2019	2.66	38.3
2020	2.80	40.3
2021	2.80	40.3
2022	2.81	40.4
2023	2.81	40.5
2024	2.82	40.6
2025	2.81	40.5

* Including area covered by forest of Abkhazia AR and Tskhinvali regions.

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL Agency of Protected Areas.
LEPL Forestry Agency of Adjara.
LEPL National Forestry Agency.

Table 2.4. Number of employees and operating costs of the National Forestry Agency

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Number of Employees (thousand persons)	0.9	0.9	0.8	0.8	0.8	0.9	1.1	1.2	1.2
Operating costs (thousand GEL)	20 242	24 770	24 345	27 974	31 523	40 264	43 381	49 886	58 045

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL National Forestry Agency.

Table 2.5. Forest and field fires

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Number of fire cases (unit)	87	23	120	145	59	63	40	38	78
Area covered by fire (hectare)	1 582	1 931	3 713	3 238	3 076	7 835	1 118	1 665	1 347

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL Agency of Protected Areas.
LEPL Forestry Agency of Adjara.
LEPL National Forestry Agency.

Table 2.6. Forest and field fires by regions, 2025

	Number of fire cases, unit	Area covered by fire, hectare
Georgia	**78**	**1 347**
Tbilisi	-	-
Adjara AR	-	-
Guria	-	-
Imereti	9	312
Kakheti	15	193
Mtskheta-Mtianeti	10	74
Racha-Lechkhumi and Kvemo Svaneti	6	40
Samegrelo-Zemo Svaneti	2	3
Samtskhe-Javakheti	6	11
Kvemo Kartli	15	623
Shida Kartli	1	2
Protected areas	**14**	**91**

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL Agency of Protected Areas.
LEPL Forestry Agency of Adjara.
LEPL National Forestry Agency.

Table 2.7. Forest restoration and afforestation

(hectare)

Year	Forest restoration and afforestation	Forest seeding and planting	Facilitating natural recovery of forest
2016	178	50	128
2017	156	44	112
2018	265	152	113
2019	201	15	186
2020	166	8	158
2021	640	7	633
2022	1 577	3	1 574
2023	1 035	4	1 031
2024	2 331	22	2 309
2025	1 907	-	1 907

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL Agency of Protected Areas.
LEPL Forestry Agency of Adjara.
LEPL National Forestry Agency.

Table 2.8. Forest seeding and planting

(hectare)

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Georgia	**44**	**152**	**15**	**8**	**7**	**3**	**4**	**22**	**-**
Tbilisi	-	-	-	-	-	-	-	-	-
Adjara AR	3	3	4	7	5	3	4	4	-
Guria	-	2	3	-	-	-	-	-	-
Imereti	-	2	-	-	-	-	-	-	-
Kakheti	-	-	-	-	-	-	-	-	-
Mtskheta-Mtianeti	2	-	-	-	-	-	-	-	-
Racha-Lechkhumi and Kvemo Svaneti	-	0	-	-	-	-	-	-	-
Samegrelo-Zemo Svaneti	1	-	1	1	-	-	-	-	-
Samtskhe-Javakheti	38	144	4	-	-	-	-	-	-
Kvemo Kartli	-	-	0	-	-	-	-	12	-
Shida Kartli	-	1	-	-	-	-	-	-	-
Protected Areas	-	-	2	-	2	-	-	6	-

Source: Ministry of Environment Protection and Agriculture of Georgia.

LEPL Agency of Protected Areas.

LEPL Forestry Agency of Adjara.

LEPL National Forestry Agency.

Table 2.9. Facilitating natural recovery of forest

(hectare)

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Georgia	**112**	**113**	**186**	**158**	**633**	**1574**	**1031**	**2309**	**1907**
Tbilisi	-	-	-	-	-	-	-	-	-
Adjara AR	100	100	100	-	190	100	100	100	6
Guria	-	3	2	-	33	-	-	677	25.7*
Imereti	12	-	23	20	317	38	136	204	-
Kakheti	-	-	0	-	-	1335	280	355	1571.8*
Mtskheta-Mtianeti	-	-	-	-	26	-	-	-	-
Racha-Lechkhumi and Kvemo Svaneti	-	-	-	14	4	-	34	101	-
Samegrelo-Zemo Svaneti	-	-	-	-	-	-	-	-	-
Samtskhe-Javakheti	-	-	-	63	30	81	372	656	124
Kvemo Kartli	-	-	12	60	33	17	88	154	65*
Shida Kartli	-	10	3	-	-	3	22	62	-
Protected Areas	-	-	45	-	-	1	-	-	115

Source: Ministry of Environment Protection a

LEPL Agency of Protected Areas.

LEPL Forestry Agency of Adjara.

LEPL National Forestry Agency.

* - Trees and plants were planted in the specified areas.

Table 2.10. Volume of felled timber

(cubic metre)

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Georgia	**630 462**	**578 031**	**515 879**	**488 773**	**453 685**	**538 784**	**478 259**	**376 215**	**425 960**
Tbilisi	...	...	...	...	...	...	...	...	...
Adjara AR	69 034	58 631	58 490	58 828	52 809	59 975	55 547	42 128	48 695
Guria	13 185	9 268	5 039	4 121	4 072	5 079	3 635	9 443	20 271
Imereti	53 277	45 483	33 854	33 088	26 477	31 459	29 802	25 669	28 157
Kakheti	132 067	97 051	94 698	69 632	55 288	53 786	52 954	49 076	43 057
Mtskheta-Mtianeti	66 790	52 485	45 339	40 824	31 124	29 025	32 171	31 856	33 125
Racha-Lechkhumi and Kvemo Svaneti	49 523	50 114	34 466	39 313	35 398	47 364	35 645	30 882	35 848
Samegrelo-Zemo Svaneti	49 564	54 202	46 763	53 180	72 679	122 921	110 749	49 110	68 041
Samtskhe-Javakheti	81 956	102 682	95 045	88 132	79 814	84 983	71 590	57 094	60 361
Kvemo Kartli	42 799	34 343	45 566	36 536	36 868	34 634	32 893	35 102	39 169
Shida Kartli	58 267	58 257	41 288	49 948	44 304	55 357	41 745	34 141	37 478
Protected areas	**14 001**	**15 515**	**15 333**	**15 170**	**14 852**	**14 202**	**11 529**	**11 714**	**11 758**

Source: Ministry of Environment Protection ai
LEPL Agency of Protected Areas.
LEPL Forestry Agency of Adjara.
LEPL National Forestry Agency.

Table 2.11. Illegal logging

(cubic metre)

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Georgia	**35 022**	**32 494**	**38 387**	**16 998**	**11 541**	**8 293**	**4 915**	**6 650**	**8 367**
Tbilisi	...	...	38	22	13	91	1	4	7
Adjara AR	1 514	1 250	1 257	663	1 018	1 471	763	625	1 542
Guria	331	194	224	89	175	98	51	147	619
Imereti	4 539	6 947	410	1 043	494	1 110	687	1 067	1 366
Kakheti	9 685	5 769	1 517	2 416	1 622	1 415	944	580	850
Mtskheta-Mtianeti	447	362	988	551	93	726	146	69	274
Racha-Lechkhumi and Kvemo Svaneti	2 032	1 717	10 151	1 611	3 424	791	234	367	760
Samegrelo-Zemo Svaneti	3 928	1 562	8 023	823	945	839	717	337	352
Samtskhe-Javakheti	9 022	6 253	808	7 113	1 889	533	491	912	1 237
Kvemo Kartli	1 227	6 015	1 007	656	1 313	560	650	702	1 179
Shida Kartli	1 975	1 632	13 670	1 841	426	644	184	1 778	166
Protected areas	**324**	**793**	**295**	**170**	**130**	**16**	**46**	**61**	**16**

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL Agency of Protected Areas.
LEPL Forestry Agency of Adjara.
Department of Environmental Supervision.

Table 2.12. Export of non-processed timber

	2017	2018	2019	2020	2021	2022	2023	2024	2025
									Thousand USD
Total export	**15.9**	**0.5**	**-**	**22.2**	**-**	**0.7**	**-**	**8.3**	**4.5**
Armenia	-	-	-	22.2	-	-	-	-	-
China	15.9	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-
Iran	-	0.5	-	-	-	-	-	8.3	4.5
Latvia	-	-	-	-	-	0.7	-	-	-
Senegal	-	-	-	-	-	-	-	-	-
Turkey	-	-	-	-	-	-	-	-	-
									Cubic metre
Total export	**200**	**1**	**-**	**116**	**-**	**0**	**-**	**59**	**30**
Armenia	-	-	-	116	-	-	-	-	-
China	200	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-
Iran	-	1	-	-	-	-	-	59	30
Latvia	-	-	-	-	-	0	-	-	-
Senegal	-	-	-	-	-	-	-	-	-
Turkey	-	-	-	-	-	-	-	-	-

Source: National Statistics Office of Geo

Table 2.13. Import of non-processed timber

	2017	2018	2019	2020	2021	2022	2023	2024	2025
									Thousand USD
Total import	**4 019.4**	**5 448.1**	**5 015.9**	**3 091.7**	**5 360.7**	**4 561.8**	**2 193.2**	**2 000.9**	**1 356.9**
Belarus	198.2	144.9	-	-	-	-	-	-	30.5
Bulgaria	199.0	246.4	-	-	-	-	-	-	-
Canada	18.9	31.1	-	-	-	-	-	-	-
Czech Republic	-	-	-	-	-	-	-	178.2	349.4
Germany	-	0.4	-	-	-	0.0	-	-	-
Latvia	764.9	712.7	53.5	-	-	-	-	-	-
Lithuania	1 094.8	1 463.8	582.6	216.9	-	-	-	32.1	-
Poland	-	172.7	86.1	-	-	-	-	51.9	-
Portugal	-	-	-	-	-	18.2	-	-	-
Russia	21.0	-	-	-	-	-	-	-	-
Slovakia	-	40.7	412.1	-	-	245.5	-	294.8	264.4
Turkey	815.9	2 624.4	3 781.4	2 874.8	5 360.7	4 298.2	2 177.1	1 444.0	712.6
Ukraine	906.7	10.9	-	-	-	-	16.1	-	-
United Kingdom	-	-	100.2	-	-	0.0	-	-	-
									Cubic metre
Total import	**25 378**	**30 901**	**37 495**	**26 574**	**40 132**	**18 339**	**10 631**	**8 505**	**4 953**
Belarus	1 160	785	-	-	-	-	-	-	210
Bulgaria	1 159	1 371	-	-	-	-	-	-	-
Canada	111	183	-	-	-	-	-	-	-
Czech Republic	-	-	-	-	-	-	-	282	479
Germany	-	1	-	-	-	0	-	-	-
Latvia	4 214	4 758	387	-	-	-	-	-	-
Lithuania	6 214	7 960	4 245	1 778	-	-	-	169	-
Poland	-	1 198	622	-	-	-	-	623	-
Portugal	-	-	-	-	-	36	-	-	-
Russia	83	-	-	-	-	-	-	-	-
Slovakia	-	85	892	-	-	388	-	451	413
Turkey	4 697	14 494	30 548	24 796	40 132	17 915	10 571	6 979	3 852
Ukraine	7 739	65	-	-	-	-	60	-	-
United Kingdom	-	-	801	-	-	0	-	-	-

Source: National Statistics Office of Georgia.

3. PROTECTED AREAS



Georgia, as a part of Caucasus, is recognized as one of the special regions regarding biodiversity. It is considered to be a “hotspot” of biodiversity as its nature is special with diversity of species, high level of endemism and ecosystems with global importance. Protected areas are key instrument for biodiversity conservation. The larger the territory under the protected areas, there are better conditions for preserving and protecting species and habitats under the threat of extinction.

The first protected area in Georgia was established in 1896 as Ajameti reserve. The reserve was for special purpose, the aim of its establishment was the protection of oak trees in Kolkheti and Imereti lowlands from the local population. Only a certain number of trees could be cut down in these forests for developing wine-making. However, the establishment of Ajameti reserve had a progressive meaning, as in those years of hardship, against the background of spontaneous development of capitalism, the forests of Imereti lowland survived from the mass felling of timber.

In 1912, was established the first complex Lagodekhi reserve, where grazing, wood cutting and hunting was banned. Lagodekhi Protected Areas is one of the world’s best-preserved, primitive area with a diversity of natural landscapes. It is located in Lagodekhi, in the extreme north-eastern part of the southern slopes of the Caucasus and extends at an altitude of 590-3500 m.

On the basis of the resolution N 1245 of the Minister of the Council of Georgia, in December 24, 1973 (for the 100 anniversary from the establishment of the first National Park) the first Saguramo National Park was established in Georgia. According to the resolution N 372, May 22, 1979 the name of Saguramo National Park was changed and was named Tbilisi National Park. It is located on southern slopes of Greater Caucasus Range Saguramo-Ialno ranges and their branches, which stretch latitudinal from river Mtkvari to river Iori, at an altitude of 600-1 700 above sea level. It includes districts of Saguramo, Gldani, Martkopi, Gulele and Gardabani.

The first three Natural Monuments in Georgia were in Vashlovani Protected Areas in 2003: Alaznis Chala, Artsivis Kheoba and Takhti-tepa with a total area of 314.5 ha.

The category of managed nature reserve did not exist in Georgia until 1996. At that time, state forest and hunting farms were created that were governed by the Main Administration of Protected Areas, Strict Nature Reserves and Hunting Farms of Georgia. The first hunting farm was created in 1957 in the Gardabani district. Managed nature reserves were created in 1997, according to the Law on Animals, on the basis of forest and hunting farms.

The first ever Protected Landscape in Georgia – Tusheti Protected Landscape was established in 2003 and in 2009 - Kintrishi Protected Landscape. This type of protected areas allow sustainable use of natural resources and development of eco-tourism in order to contribute towards conservation objectives.

Establishment of protected areas in Georgia aims at preserving natural and cultural environment and its components, protecting conditions for mental and physical health of humans and creating one of the important fundaments for civilized development of the society. Protected areas in Georgia are created for protecting and restoration of important national heritage – unique and rare ecosystems, plant and animal species, cultural areas and for using them for scientific, educational and recreational purposes. In accordance with the data provided by the Agency of the Protected Areas of Georgia, in 2025 the protected areas within the country are categorized as follows, with each category contributing a percentage to the total expanse of protected areas in Georgia: strict nature reserves constitute 13.9%, national parks account for 55.1%, managed nature reserves make up 11.4%, natural monuments represent 0.3%, protected landscapes encompass 18.0%, and multiple-use areas comprise 1.4%.

The main purpose of establishing protected areas is restoration and protection of natural ecosystems, landscapes and living organisms, gene pool of threatened Red List species of wild animals and plants, unique and rare organic and nonorganic natural components and territories under threat of flooding, landslides and avalanches, and areas of surface and ground water formation.

According to the data from 2025, the area of Georgia's protected territories is 930 thousand hectares, which constitutes 13.3% of the country's territory. The largest portion of the protected territories is occupied by national parks, covering 512 thousand hectares, followed by protected landscapes with 167 thousand hectares, state reserves with 129 thousand hectares, managed reserves with 106 thousand hectares, multiple-use areas with 13 thousand hectares, and natural monuments with 3 thousand hectares.

Definition of terms used in tables

Biocenosis	Unity of plants and animals which exist in more or less similar conditions (animals and plants of particular field or coast).
Managed reserve	Protected area established for the purpose of protecting natural conditions for preservation of wild species, biocenosis and nonorganic formations of national importance, which from humans' side requires special restoration and care activities. In reserve it is allowed to use particular renewable recourses in conditions of strict control and supervision.
National park	Protected area established for preservation of relatively big and wonderful ecosystems, of national and international importance, as well as for recreational activities, where not or less damaged ecosystems, biocenosis and species included in the red list of Georgia are presented.
Natural monument	A relatively small area of national importance, represented by ecosystems of rare, unique and highly aesthetic features, specific geographical and hydrological formations, and individual samples of plants or fossils of living organisms. Natural Monument can be a cave, a valley, river deltas, wood groves, etc.
Protected area	Land territory or area of water having a special importance for preservation of cultural phenomena involved in biological diversity, natural resources and natural environment, which is protected and managed under long-term and solid legal grounds. There are following categories of protected areas in Georgia: strict nature reserves, national parks, managed nature reserves, natural monuments, protected landscapes and multiple use areas.
Protected landscape	Protected area established for protecting natural cultural landscape developed as a result of harmonic interaction of human and nature, preservation of vital environment, recreational, tourism and traditional activities.
Strict nature reserve	Strict nature reserves are established in order to maintain nature, natural processes and genetic resources in a dynamic and pristine condition, and to conduct scientific research and studies, with a minor impact, for educational and environmental monitoring purposes.
Vaucluse	An underground river emerging at the Earth's surface as a spring.
Travertine	Dense, banded rock composed of calcium carbonate, formed by the evaporation of river and spring waters.

Table 3.1. Structure of protected areas of Georgia, 2025

	Name
1	**Administration of Borjomi-Kharagauli National Park**
	Protected areas under supervision:
	Borjomi Strict Nature Reserve
	Borjomi-Kharagauli National Park
	Goderdzi Petrified Forest Natural Monument
	Ktsia-Tabatskuri Managed Reserve
	Nedzvi Managed Reserve
2	**Administration of Tusheti Protected Areas**
	Protected areas under supervision:
	Tusheti Strict Nature Reserve
	Tusheti National Park
3	**Administration of Vashlovani Protected Areas**
	Protected areas under supervision:
	Alazani Floodplains National Monument
	Eagle Gorge Natural Monument
	Takhti-Tepa Natural Monument
	Vashlovani National Park
	Vashlovani Strict Nature Reserve
4	**Administration of Kintrishi Protected Areas**
	Protected areas under supervision:
	Kintrishi National Park
	Kintrishi Strict Nature Reserve
5	**Administration of Lagodekhi Protected Areas**
	Protected areas under supervision:
	Lagodekhi Managed Reserve
	Lagodekhi Strict Nature Reserve
6	**Administration of Mariamjvari Strict Nature Reserve**
	Protected areas under supervision:
	Iori Managed Reserve
	Korughi Managed Reserve
	Mariamjvari Strict Nature Reserve
	Tsiv-Gombori Managed Reserve
7	**Administration of Kazbegi National Park**
	Protected areas under supervision:
	Abano Mineral Water Lake Natural Monument
	Jvari Overpass Travertine Natural Monument
	Kazbegi National Park
	Keterisi Mineral Vaucluse Natural Monument
	Sakhizari Natural Monument
	Truso Travertine National Monument

continued

8	**Administration of Kobuleti Protected Areas**
	Protected areas under supervision:
	Kobuleti Managed Reserve
	Kobuleti Strict Nature Reserve
9	**Administration of Imereti Caves Protected Areas**
	Protected areas under supervision:
	Bgheri Cave Natural Monument
	Didghele Cave Natural Monument
	Gabzaruli Lake Natural Monument
	Ghliana Cave Natural Monument
	Jason's Cave Natural Monument
	Khomuli Cave Natural Monument
	Melouri Cave Natural Monument
	Mukhura Waterfall Natural Monument
	Navenakhevi Cave Natural Monument
	Prometheus Natural Monument
	Sakazhia Cave Natural Monument
	Sataplia Managed Reserve
	Sataplia Strict Nature Reserve
	Satsurblia Cave Natural Monument
	Solkota Cave Natural Monument
	Tskaltsitela Gorge Natural Monument
	Tsutskhvati Cave Natural Monument
	White Cave Natural Monument
10	**Administration of Martvili and Okatse Natural Monument**
	Protected areas under supervision:
	Abasha Waterfall Natural Monument
	Baldi Canion Natural Monument
	Jortsku Cave Natural Monument
	Martvili (Gochkadila) Canyon Natural Monument
	Nazodelao Cave Natural Monument
	Ochkhomuri Waterfall Natural Monument
	Okatse Canyon Natural Monument
	Okatse Waterfall Natural Monument
	Oniore Waterfall and the Tobas's First Cave Natural Monument
	Toba Waterfall and Arsen Okrojanashvili Natural Monument
11	**Administration of Mtirala National Park**
	Protected areas under supervision:
	Mtirala National Park
12	**Administration of Algeti National Park**
	Protected areas under supervision:
	Algeti National Park
	Birtvisi Natural Monument
	Dashbashi Canyon Natural Monument
	Samshvilde Canyon Natural Monument

continued

13	**Administration of Batsara-Babaneuri Protected Areas**
	Protected areas under supervision:
	Babaneuri Strict Nature Reserve
	Batsara Strict Nature Reserve
	Ilto Managed Reserve
14	**Administration of Tbilisi National Park**
	Protected areas under supervision:
	Bodorna Rock Column Natural Monument
	Gardabani Managed Reserve
	Tbilisi National Park
15	**Administration of Kolkheti National Park**
	Protected areas under supervision:
	Katsoburi Managed Reserve
	Kolkheti National Park
	Guria National Park
16	**Administration of Ajameti Managed Reserve**
	Protected areas under supervision:
	Ajameti Managed Reserve
17	**Administration of Chachuna Managed Reserve**
	Protected areas under supervision:
	Chachuna Managed Reserve
18	**Administration of Javakheti Protected Areas**
	Protected areas under supervision:
	Abuli Lake Managed Reserve
	Bughdasheni Lake Managed Reserve
	Javakheti National Park
	Kartsakhi Lake Managed Reserve
	Khanchali Lake Managed Reserve
	Madatapa Managed Reserve
	Paravani Lake Managed Reserve
	Saghamo Lake Managed Reserve
	Sulda Managed Reserve
	Tetrobi Managed Reserve
19	**Admiinistrations of Machakhela National Park**
	Protected areas under supervision:
	Machakhela National Park
20	**Administration of Pshav-Khevsureti National Park**
	Protected areas under supervision:
	Asa Managed Reserve
	Pshav-Khevsureti National Park
	Roshka Natural Monument
21	**Administration of Liakhvi Strict Nature Reserve**

continued

22	**Administration of Pskhu-Gumista Strict Nature Reserve**
	Protected areas under supervision:
	Gumista Strict Nature Reserve
	Pskhu Strict Nature Reserve
23	**Administration of Ritsa Strict Nature Reserve**
24	**Administration of Bichvinta-Miusera Strict Nature Reserve**
	Protected areas under supervision:
	Bichvinta Strict Nature Reserve
	Miusera Strict Nature Reserve
25	**Administration of Erusheti National Park**
	Protected areas under supervision:
	Erusheti National Park
26	**Administration of Racha National Park**
	Protected areas under supervision:
	Racha National Park
27	**Administration of Tana Managed Reserve**
	Protected areas under supervision:
	Tana Managed Reserve
28	**Administration of Kvereti Managed Reserve**
	Protected areas under supervision:
	Kvereti Managed Reserve
29	**Under the supervision of Local Municipality:**
	Tusheti Protected Landscape
	Aragvi Protected Landscape
	Truso Protected Landscape
	Machakhela Protected Landscape

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL Agency of Protected Areas.

Table 3.2. Protected areas of Georgia by categories, 2025

	Name	Total area, hectare
Protected areas, total*		**929 990**
	Area of strict nature reserves	**128 968**
1	Babaneuri	834
2	Batsara	3 036
3	Bichvinta-Miusera	3 645
4	Borjomi	13 188
5	Kintrishi	3 108
6	Kobuleti	316
7	Lagodekhi	19 755
8	Liakhvi	6 388
9	Mariamjvari	1 023
10	Pskhu-Gumista	40 819
11	Ritsa	16 289
12	Sataplia	330
13	Tusheti	10 275
14	Vashlovani	9 962
	Area of national parks	**512 216**
1	Algeti	8 768
2	Borjomi-Kharagauli	64 737
3	Erusheti	11 407
4	Guria	15 310
5	Javakheti	13 498
6	Kazbegi	78 204
7	Kintrishi	10 406
8	Kolkheti	44 980
9	Machakhela	7 333
10	Mtirala	15 580
11	Pshav-Khevsureti	73 765
12	Racha	50 835
13	Tbilisi	21 031
14	Tusheti	71 341
15	Vashlovani	25 021
	Area of managed reserves	**105 555**
1	Abuli Lake	240
2	Ajameti	4 991
3	Asa	3 943
4	Bughdasheni	119
5	Chachuna	5 032
6	Gardabani	3 734
7	Ilto	7 591
8	Iori	2 127
9	Kacoburi	271
10	Kartsakhi	158

continued

11	Khanchali	727
12	Kobuleti	466
13	Korughi	1 716
14	Ktsia-Tabatskuri	20 476
15	Kvereti	14 797
16	Lagodekhi	4 500
17	Madatapa	1 398
18	Nedzvi	9 213
19	Paravani Lake	3 996
20	Sagamo Lake	634
21	Sataplia	34
22	Sulda	309
23	Tana	10 986
24	Tetrobi	3 089
25	Tsiv-Gombori	5 009
	Area of natural monuments**	**2 731**
1	Abano Mineral Lake	0
2	Alazani Floodplain Forests	201
3	Artsivi Gorge	98
4	Balda Canyon	8
5	Bgheri Cave	0
6	Birtvisi	514
7	Bodorna Rock Columns	20
8	Dashbashi Canyon	538
9	Didghele Cave	0
10	Gabzaruli Lake	0
11	Ghliana Cave	0
12	Goderdzi Pertified Forest	36
13	Jason's Cave	1
14	Jortsku Cave	0
15	Jvari Overpass Travertine	3
16	Keterisi Mineral Vaucluse	1
17	Khomuli Cave	0
18	Martvili (Gochkadila) Canyon	13
19	Melouri Cave	0
20	Mukhura Waterfall	4
21	Navenakhevi Cave	1
22	Nazodelao Cave	7
23	Ochkhomuri Waterfall	1
24	Okatse Canyon	73
25	Okatse Waterfall	29
26	Oniore Waterfall and the First Toba Cave	97
27	Prometheus Cave	41
28	Roshka	110

continued

29	Sakazhia Cave	0
30	Sakhizari Cliff	336
31	Samshvilde Canyon	405
32	Satsurblia Cave	0
33	Solkota Cave	0
34	Takhti-Tepa	10
35	The River Abasha Waterfall	91
36	Toba Waterfall and Arsen Okrojanashvili Cave	68
37	Truso Travertines	4
38	Tskaltsitela Gorge	12
39	Tsutskhvati Cave	9
40	White Cave	1
	Area of protected landscapes	**167 247**
1	Aragvi	99 802
2	Machakhela	4 294
3	Tana-Tedzami	21 864
4	Truso	7 007
5	Tusheti	34 280
	Multipurpose Use Protected Area	**13 273**
1	On The Creation and Management Of The Nugzar Zazanashvili Samukhi Multipurpose Use Protected Area	13 273

* Including Autonomous Republic of Abkhazia and Tskhinvali region.

** Covers only areas of natural monuments with marked and registered borders and areas.

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL Agency of Protected Areas.

Table 3.3. Area and categories of protected areas of Georgia*, 2025

	Number, unit	Area, hectare
Strict nature reserves	14	128 968
National parks	15	512 216
Managed nature reserves	25	105 555
Natural monuments	40	2 731
Protected landscapes	5	167 247
Multipurpose Use Protected Area	1	13 273

* Including Autonomous Republic of Abkhazia and Tskhinvali region.

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL Agency of Protected Areas.

Table 3.4. Number of main mammal species preserved in the protected areas

(unit)

Name	2017	2018	2019	2020	2021	2022	2023	2024	2025
Chamois	375	670	707	700	796	868	788	718	694
Brown bear	344	503	505	476	572	591	688	806	788
Gazelle	...	...	120	150	200	250	450	450	500
Grey wolf	502	1038	495	381	501	521	716	480	702
Hyena	8	...	...	...	1	1	1	0	0
Lynx	88	134	119	101	121	183	178	171	138
Otter	237	383	341	163	267	204	158	100	84
Red deer	1 047	993	922	1 220	1 169	1 334	1 352	1 300	1 355
Roe	2 609	3 892	3 858	1 801	4 039	3 778	4 144	3 092	3 320
East Caucasian (Daghestan) tur	708	1650	1384	2 073	2 529	2 565	2 740	2 883	3 105
Wild boar	794	1 390	1 261	1 006	621	539	1 264	1 170	1 982
Wild goat	457	563	551	628	515	642	675	675	705
Wildcat	216	270	230	629	186	104	98	308	259

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL Agency of Protected Areas.

Table 3.5. Number of main bird species preserved in the protected areas

(unit)

Name	2017	2018	2019	2020	2021	2022	2023	2024	2025
Black stork	415	30	1 093	78	253	17	30	19	30
Caucasian grouse	1 017	1 308	1 119	1 230	1 422	1 311	1 289	983	1 427
Caucasian snowcock	568	594	508	684	620	598	605	722	767
Cinereous vulture	182	228	135	190	197	131	89	111	104
Eastern imperial eagle	56	56	32	63	70	57	103	93	50
Falcon	67	120	205	107	92	93	33	7	18
Golden eagle	51	60	47	57	126	59	112	81	45
Grey partridge	...	...	...	15	97	285	320	68	290
Gyps	231	...	190	159	148	106	194	179	197
Pheasant	1 725	1 800	1 125	476	1 046	953	1 013	186	1 005
Rock partridge	3 106	2 100	1 500	3 759	2 938	1 293	3 514	3 956	5 030
Sparrowhawk	327	218	430	322	2 020	354	2 664	972	405
Tawny eagle	25	25	194	61	62	185	-	18	45
Woodpecker	...	591	559	525	1 482	1 703	827	1 463	1 168

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL Agency of Protected Areas.

Table 3.6. Expenses on the maintenance of protected areas and number of employees, 2025

Administration	Person					Thousand GEL		
	Total number of employees	Head	Specialist of natural resources	Security staff	Other staff	Total expenses on maintenance of protected areas	From state budget	From other sources
Total in Georgia	**781**	**24**	**28**	**446**	**148**	**36 772.3**	**20 343.1**	**16 429.2**
Agency of Protected Areas	135	0	0	0	0	17 936.4	10 798.5	7 137.9
Ajameti Managed Nature Reserve	16	1	1	14	0	425.3	197.4	227.9
Algeti National Park	21	1	2	14	4	575.4	274.3	301.1
Batsara- Babaneuri Protected Areas	20	1	1	18	0	593.6	234.0	359.6
Borjomi-Kharagauli National Park	80	1	2	62	15	2 297.4	1 033.4	1 264.0
Chachuna Managed Nature Reserve	10	1	1	7	1	225.1	114.6	110.5
Erusheti National Park	12	1	1	10	0	344.5	157.6	186.9
Guria National Park	13	0	0	11	2	226.1	84.1	142.0
Imereti Caves Protected Areas	61	1	1	19	40	2 168.9	1 472.4	696.5
Javakheti Protected areas	17	1	1	11	4	600.6	191.4	409.2
Kazbegi National Park	25	1	1	15	8	681.2	378.7	302.5
Kintrishi Protected Areas	13	1	1	7	4	463.2	289.3	173.9
Kobuleti Protected Areas	11	1	1	5	4	277.3	141.3	136.1
Kolkheti National Park	47	1	2	35	9	1 395.5	586.0	809.5
Kvereti Managed Nature Reserve	23	1	1	18	3	584.6	283.3	301.3
Lagodekhi Protected Areas	24	1	1	17	5	604.4	331.2	273.2
Machakhela National Park	17	1	1	10	5	465.0	232.8	232.2
Mariamjvari Strict Nature Reserve	16	1	1	14	0	477.1	248.4	228.7
Martvili and Okatse Natural Monument	38	1	1	21	15	1 438.4	955.1	483.3
Mtirala National Park	17	1	1	13	2	682.1	426.9	255.2
Pshav-Khevsureti National Park	25	1	1	20	3	612.6	307.2	305.4
Racha National Park	14	1	1	10	2	365.3	8.7	356.6
Tana Managed Nature Reserve	13	1	1	9	2	363.4	194.7	168.8
Tbilisi National Park	39	1	2	28	8	1 031.5	531.4	500.1
Tusheti Protected Areas	27	1	1	19	6	717.2	373.8	343.4
Vashlovani Protected Areas	47	1	1	39	6	1 220.1	496.7	723.5

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL Agency of Protected Areas.

4. WATER RESOURCES



Water is unique and foremost natural resource, a vital product needed for the existence of humanity, wild-life and vegetation. Water, along with the air, is a primary human necessity, which is why water is considered a unique resource.

Area of the earth surface is 510.0 million square kilometres, its 71%, that is 362million square kilometres, is occupied by the ocean that creates illusion of abundance of water resources. In fact 97.5% (1 353.3 million cubic kilometres) of the total hydrosphere reserve (1 388 million cubic kilometres) is almost useless for economic activities, due to its salinity (the World Ocean, the salty lakes and the wetlands). Share of the fresh water that exists in form of rivers, glaciers, ground waters, lakes, reservoirs and wetlands, is just 2.5% or 34.7 million cubic metres. Today only 12% of total fresh water stock, or 4.16 million cubic metres is being used, that clearly demonstrates problem of fresh water deficit.

Freshwater resources represent one of Georgia's main assets. The mountainous terrain of Georgia's territory, coupled with abundant atmospheric precipitation, especially in the Black Sea basin, determines that, based on the average height of the freshwater layer formed over its territory in one year, Georgia occupies a significant place among the world's water-rich countries. Among European countries, it is only surpassed by Norway, Switzerland, and Austria.There are 26,060 rivers in Georgia, and their total length is approximately 60 thousand km. Of these, 18,109 rivers belong to the Black Sea basin, while 7,951 belong to the Caspian Sea basin, which is 30% of the total number of rivers in Georgia. The majority of Georgian rivers are of the mountain river type. Due to the highly dissected surface relief, rivers with great length and large basin areas are not found here. The average length of the rivers is 2.3 km.Despite the small size of Georgia's rivers in terms of their length and catchment basins, they are quite abundant in water, particularly those in the Black Sea basin. Rivers are unevenly distributed across the territory of Georgia. 75% of Georgia's water resources are formed in Western Georgia. The total annual discharge of Georgia's rivers is $61.45 billion m^3, of which approximately 86% ($52.77 billion m^3) is formed within the country's territory, and the remainder flows into Georgia from neighboring countries.

Water resources in Georgia are unequally distributed and are mainly concentrated in western part of it, whereas eastern regions often experience water shortages. Almost all East Georgian rivers create the Mtkvari river single system flowing into Caspian; and West Georgian rivers flow into the Black Sea individually. In Western Georgia run-off of rivers (together with transit run-off) is 49.8 km^3, and in Eastern Georgia – 16.5 km^3.

The problem of water consumption has a great importance among the factors having an impact on the river ecosystem, since using of water for economic activities, especially for irrigation causes lowering the water level, i.e. reduction of water resources.

Georgia is a country of small lakes. There are approximately 856 lakes in total here. The area of more than half of the lakes is less than $0.1 km2. Because of this, the total area of Georgia's lakes amounts to only about $170 km2, which is 0.24% of the country's entire territory.A total of 734 glaciers have been recorded in Georgia, with a total area of $511.12 km2, which constitutes 0.73% of Georgia's entire territory. The majority of the glaciers are concentrated in Western Georgia (67.3% by number, 81.2% by area). The water reserves contained in the glaciers represent a significant characteristic of glacial resources. $30.13 billion m3 of ice is accumulated in the glaciers on the territory of Georgia.

Increasing level of hydrosphere pollution is even more important and problematic. The main reasons for worsening water quality are the following: irrigation, melioration of salty soils, wastewater, and improperly arraigned reservoir caves. Importance of this problem can be justified by the following general examples: even those wastewaters which, after treatment return to the primary sources, require 15 fold dilutions with clean water in order to restore natural quality of water.

Annual volume of wastewater of any types pollutes 12-15 times more natural water in general, that is a significant part of river run-off.

The waters within the land territory, its subsoil, continental shelf, territorial waters, and special economic zone of Georgia are a national treasure of Georgia and shall be protected by the State.

Inland water resources located on the country territory are the state property and can be used only on the basis of the licenses issued by authorized agencies. Ownership of the land does not imply permission for water use. Throwing or burring industrial, household, toxic, radioactive and other hazardous waste into the water bodies or nearby areas is prohibited as well as discharge of wastewater without having an appropriate license.

Despite of great importance of administrative-legislative policies, economically grounded scientific-technical activities play decisive role in environmental protection. For example, rational allocation of industrial objects according to availability of water resources and its quality and implementing the technologies, that ensures getting the production with minimal consumption of natural resources and minimizing hazardous waste.

In Georgia, most large and medium-sized rivers, 20 in total, are located in the western part of the country and flow into the Black Sea. In eastern Georgia, there are 12 large and medium rivers, which belong to the Caspian Sea basin. The Alazani River is the longest river within Georgia's borders, stretching 362 kilometers. However, the Mtkvari River ranks first in terms of watershed basin area, covering 188,000 square kilometers.

Swamps and Reservoirs

In the recent past, swamps (marshes/wetlands) occupied a significant place in Georgia, particularly on the Kolkhida Lowland. Swamps are considered permanently undrained wetland territories that are covered by a peat layer of at least 30 cm thickness. The structure of peat determines its ability to hold a large amount of water (more than 95% of its volume). Strictly speaking, peaty swamps were few in Georgia, but together with wetlands, their area amounted to 256 thousand hectares, with 225 thousand hectares falling on Western Georgia. Currently, a part of the swamps and wetlands has been drained. Swamps are now only found in the western, coastal part of the Kolkhida Lowland, and their total area is approximately 627 km2. Swamps affect the climate, as well as the hydrological and hydrogeological regimes, and thus represent a significant factor determining the ecological balance of the territory.A significant part of our country's water resources is accumulated in Georgia's reservoirs. Currently, there are 44 reservoirs in operation whose volume exceeds 0.5 million m3. Eight of these reservoirs are built in Western Georgia and are intended for energy purposes, except for one irrigation reservoir. Their total usable volume is 0.85 km3. The relatively lower humidity of Eastern Georgia determines that the purpose of most of the reservoirs here is irrigation. The construction of several reservoirs is currently halted.Georgia's reservoirs are vitally important for the country's energy sector, agriculture, and water supply. They are artificially created water basins that serve the functioning of hydroelectric power plants (HPPs), the provision of irrigation systems, and the regulation of river regimes.

Major Reservoirs and Their Purpose

Tsalka Reservoir: Georgia's largest reservoir, located in Samtskhe-Javakheti, Tsalka Municipality, at an altitude of 1506 meters above sea level, in the Khrami River valley. It is elongated from west to east. The banks are mostly low and gentle, while the southeastern section of the coast is steep and high. It is fed by the waters of the Khrami and other small rivers, as well as by groundwater, snow, and rain. It was created by a concrete dam built in a narrow and deep valley carved out in a lava ridge, for energy purposes in 1946. It is subject to seasonal regulation. An ice cover forms on the reservoir from December until the end of March. The Ktsia-Khrami River flows through the reservoir.

Jvari Reservoir: It is located on the Enguri River and is one of the reservoirs with the world's highest dams (dam height 71.5 meters. Surface area 13.5 km2. Water volume 1100 \million m3. It is the main energy source for Enguri Hydroelectric Power Plant , which is Georgia's largest hydroelectric power plant.

Samgori Reservoir: Also known as the "Tbilisi Sea." It is located on the Iori Upland, northeast of the city of Tbilisi. It was created in place of the saline lakes of Avlabari, Ilguniani, and Kukia. Area 11.8 km2. Water volume 308 million m3. It is used for irrigating the Mukhrani and Saguramo plains. Its main purpose is to satisfy agricultural needs.

Zhinvali Reservoir: It is located in Mtskheta-Mtianeti region, Dusheti Municipality, north of the town of Zhinvali, in the middle reaches of the Aragvi River. The Zhinvali Reservoir is situated between the Aleumi, Gudamaqari, and Kartli Ranges. Its surface area is 11.5 km2, and its maximum depth is 98 m. The reservoir is of great importance for the water supply of the city of Tbilisi, supplying about half of Tbilisi's population with drinking water.

Shaori Reservoir: The largest reservoir in Racha-Lechkhumi and Kvemo Svaneti region, Ambrolauri Municipality. It is located on the northern slope of the Racha Range, in the Shaori hollow (depression). It was created by an earth embankment dam that impounds the Shaori River. Area 13.2 km2. Water volume 90.0 million m3. It is fed by tributaries and precipitation that falls on its surface. It is used for hydroelectric purposes. It is part of the Shaori Hydroelectric Power Plant complex and contributes to electricity generation.

Tqibuli Reservoir: It is located in Western Georgia, Tqibuli Municipality. It is situated in the Okriba hollow (depression). The reservoir was created by an earth embankment dam that impounds the Tqibula River where it used to disappear into a karst shaft at the bottom of the hollow, near the so-called "Tsqaldasavali" (water-sink). The reservoir has small bays, and there are islands in its middle and western parts. Area 11.5 km2. Water volume 84 million m3. It was created for the construction of the Tqibuli Hydroelectric Power Plant . This reservoir helps regulate the water resources of the Tqibula River and generate energy.

Gali Reservoir: A reservoir in Western Georgia, Gali Municipality, on the Erisqali River, (a left tributary of the Oqumi), near the village of Rechkha. Built in 1969. The catchment basin area is 166 km2, the total water volume is 145 million m3. It is mainly fed by the runoff of the Erisqali River and the Enguri River runoff, which flows into the reservoir through the pressure diversion tunnel of the Enguri Hydroelectric Power Plant. Its main purpose is the multi-year regulation of the Enguri River runoff and the daily regulation of the Erisqali River runoff for energy purposes.

Sioni Reservoir: A reservoir in Eastern Georgia, Mtskheta-Mtianeti region, Tianeti Municipality. It is located in the middle reaches of the Iori River. It is situated between the town of Sioni and the village of Lelovani. It is mainly fed by the water of the Iori River. It is intended for the multi-year regulation of the Iori River runoff. It is used for irrigation. The Sioni hydro-complex also facilitates the operation of a cascade of small Hydroelectric Power Plants.

Economic and Environmental Significance

Georgia's reservoirs play a huge role in the country's energy security, as HPPs are the main source of renewable energy. Furthermore, they are important for irrigation, which is essential for increasing agricultural productivity. However, the construction of reservoirs also affects the environment. They can alter river ecosystems, cause sediment accumulation, and impact the natural landscape of adjacent territories. Therefore, Environmental Impact Assessment (EIA) is crucial when planning new projects.

Georgia is rich in groundwater resources, which is determined by the abundant atmospheric precipitation, geological structure, and hydrogeological characteristics of its territory. According to the latest data, the natural resources of Georgia's freshwater groundwater amount to 573 m3/s. These waters are suitable for drinking and are divided into two groups based on the magnitude of total mineralization: The first group includes waters with mineralization up to 0.2 g/L, which are mainly of hydrocarbonate-calcium chemical composition. Significant resources of these waters are formed in the Samtskhe-Javakheti and Kvemo Kartli regions. The second group is groundwater with a mineralization of 0.2-1.0 g/L, which is characterized by various chemical compositions and is unevenly, but distributed across almost the entire territory of Georgia.

In addition to freshwater groundwater, the territory of Georgia is also rich in mineral waters. The number of mineral groundwater boreholes and springs exceeds 2000. Individual and clustered occurrences (boreholes, springs) of thermal waters are also significant. The main water consumers in Georgia are the agricultural, energy, and domestic sectors. In terms of water consumption, agriculture is the largest water consumer in Georgia. The largest amount of water in this sector is used for irrigation purposes, while the domestic sector is the second-largest water consumer in Georgia. This sector mainly consumes water for drinking and household purposes.

Definition of terms used in tables

Losses of water during transport	Volume of water lost from the point of abstraction to the point of its use or transmission due to filtration, evaporation, leakage, burst mains or other reasons.
Mechanical treatment of wastewater	Process of wastewater treatment which is used for filtering wastewater from solid particles, stones, sand, waste, etc.
Water abstraction from natural water bodies	Volume of water taken from surface water bodies (rivers, lakes and seas) and groundwater bodies for further use. This indicator does not include volume of transit water supplied to big channels and volume of water taken by population from wells, natural reservoirs, etc.
Polluted wastewater	Industrial and household wastewater (including mine, fossil and draining waters) which contains much more polluting substances than admissible amount.
Water use	Use of water resources abstracted from different sources (surface, main, ground, sea, etc.) for various needs; volume of used water does not include cycling water supply, wastewater of secondary use as well as wastewater controlling draining waters.
Water use for drinking and household needs	Volume of water used by population and employees of enterprises and organizations (excluding agricultural ones) for economic, household and communal needs.
Water use for industrial needs	Total volume of water used for industrial needs (excluding agriculture) and for filling the cycling water supply systems.
Water supply system	System of receiving, transportation and distribution of water (pipelines, reservoirs, open and closed channels, etc) that is used for supplying water to customers.

Table 4.1. Big and medium rivers of Georgia

Name of the river	Length of the river on the territory of Georgia (km)	Area of river basin (km^2)	Corresponding sea basin
Alazani	362	11 800	The Caspian Sea
Rioni	327	13 400	The Black Sea
Mtkvari	326	188 000	The Caspian Sea
Iori	320	4 650	The Caspian Sea
Enguri	213	4 060	The Black Sea
Ktsia-Khrami	201	8 340	The Caspian Sea
Tskhenistskali	176	2 120	The Black Sea
Khobi	150	1 340	The Black Sea
Kvirila	140	3 630	The Black Sea
Algeti	118	763	The Caspian Sea
Kodori	110	2 030	The Black Sea
Bzipi	110	1 510	The Black Sea
Supsa	108	1 130	The Black Sea
Tekhuri	101	1 040	The Black Sea
Didi Liakhvi	98	2 440	The Caspian Sea
Acharistskali	90	1 540	The Black Sea
Ksani	84	885	The Black Sea
Dzirula	83	1 270	The Caspian Sea
Paravani	74	2 350	The Black Sea
Aragvi	66	2 740	The Caspian Sea
Mashavera	66	1 390	The Caspian Sea
Abasha	66	350	The Caspian Sea
Patara Liakhvi	63	513	The Black Sea
Natanebi	60	657	The Caspian Sea
Khanistskali	57	914	The Black Sea
Okumi	56	559	The Black Sea
Ghalidzga	53	483	The Black Sea
Psou	53	421	The Black Sea
Tedzami	51	404	The Caspian Sea
Mokvi	50	356	The Black Sea
Chorokhi	26	22 100	The Black Sea
Chanchakhi	20	185	The Black Sea

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL National Environmental Agency.

Table 4.2. Main lakes and reservoirs of Georgia

Name	Surface area (km^2)	Volume (mln. m^3)	Average depth (m)	Maximum depth (m)
Lake Paravani	37.5	90.8	2.4	3.3
Tsalka Reservoir	33.7	312.0	9.3	25.0
Lake Khozapini	26.3	19.3	0.7	1.0
Lake Paliastomi	18.2	52.0	2.1	3.2
Lake Tabatskuri	14.2	221.0	15.6	40.0
Jvari Reservoir	13.5	1 092.0	115.0	230.0
Shaori Reservoir	13.2	90.0	6.8	11.5
Lake Jandara	10.6	52.0	4.8	7.2
Sioni Reservoir	12.0	325.0	25.4	67.5
Samgori Reservoir	11.8	308.0	26.2	45.0
Jinvali Reservoir	11.5	520.0	50.0	98.0
Tkibuli Reservoir	11.5	84.0	16.0	32.0
Gali Reservoir	8.0	145.0	17.0	52.0
Lake Saghamo	4.8	7.7	1.6	2.3
Lake Ritsa	1.5	94.0	63.1	101.0
Lake Bazaleti	1.2	5.6	4.5	7.0
Lake Lisi	0.5	1.2	2.6	4.0

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL National Environmental Agency.

Table 4.3. Main indicators for water supply industry and wastewater collection

	2020	2021	2022	2023	2024	2025
	Percentage					
Population connected to water supply industry	68.9	71.3	71.5	74.5	71.0	72.8
Population connected to a wastewater collecting system	50.1	51.5	52.4	53.7	50.9	52.3
Population connected to wastewater treatment facilities	36.5	37.0	39.8	41.2	40.5	41.6
of which:						
Primary/mechanical treatment	0.4	0.4	0.5	0.5	0.5	0.5
Secondary/biological treatment	5.2	5.2	6.5	6.7	7.4	7.9
Tertiary/advanced treatment	30.9	31.4	32.8	34.0	32.6	33.2
	Million cubic metres					
Gross volume of water supplied by water supply industry	760.1	931.5	890.2	874.6	868.5	869.1
Losses of water during transport	491.6	677.9	638.5	597.1	581.9	559.9
Net volume of water supplied by water supply industry	268.6	253.6	251.7	277.5	286.6	309.2
Water supplied to households by water supply industry	229.2	210.1	208.0	231.5	243.4	258.6

Source: National Statistics Office of Georgia.

Table 4.4. Main indicators for protection and use of water resources

(million cubic metres)

	2020	2021	2022	2023	2024	2025
Water abstraction from natural water bodies, total*	**2 079.3**	**2 193.1**	**2 081.7**	**2 251.8**	**2 583.5**	**1 745.8**
Water abstraction from groundwater bodies	511.8	506.8	526.2	507.5	514.6	663.6
Water use, total*	**1 063.9**	**1 152.8**	**844.1**	**912.8**	**934.6**	**758.7**
Household needs	256.6	236.5	234.0	237.5	250.9	273.8
Industrial needs	82.8	71.0	78.4	80.8	82.8	70.6
Other needs	724.5	845.3	531.7	594.4	600.9	414.3
Wastewater discharge into surface water bodies, total	**280.8**	**246.3**	**245.7**	**342.9**	**326.5**	**327.5**
Polluted wastewater	86.5	76.2	75.1	75.0	72.5	71.2
Losses of water during transport	**1 015.4**	**1 040.3**	**1 237.6**	**1 339.1**	**1 648.9**	**987.1**
Cycling and secondary water supply	**315.2**	**307.1**	**307.6**	**302.6**	**310.9**	**111.1**

* Water for hydroelectricity generation purposes is excluded.

Source: Ministry of Environment Protection and Agriculture of Georgia.

5. AMBIENT AIR PROTECTION



Atmospheric air that surrounds the earth is one of the main components of environment and represents source of life on our planet. Atmosphere protects the earth from destructive impact of meteorites: most of them burn while flying through the dense layers of atmosphere; it also detains a large share of ultraviolet radiation and ensures life existence on the earth. Atmosphere basically consists of nitrogen (78.1%) and oxygen (20.9%). Carbon dioxide has a very small share in the atmosphere (0.03%), but plays a special role since it absorbs and releases long wave radiation. Moreover, carbon dioxide is essential for plants.

Atmosphere always contains water steam in different quantities and its role is significant in atmospheric events: water steam condensation causes creation of clouds and precipitation, and its transformation is followed by absorption or emission of big amount of warmth. It is known that a person consumes about 1 kg of food, 1.5 kg of water daily, and in resting state - 12 kg and 10 times more during physical activity. It is possible to check the quality of water or food and treat them when needed, but the air is consumed as it is in the environment. This is a good example for realizing importance of protecting of atmospheric air form hazardous substances.

Air pollution is spread in several kilometres vertically. During the last decades the amount of polluting substances into atmospheric air increased twenty times. Atmosphere is highly polluted by the enterprises of black and coloured metallurgy, and chemical industry that emit sulphur gases, carbon dioxide, dust and other substances.

Transport emissions have a significant share in total air pollution. One of the alternatives for reducing transport emission can be improvement of internal combustion engine and petrol quality, use of electro mobiles, etc.

Greening industrial sites and development of forestry economy has a great importance for implementation of measures aiming protection of atmospheric air. One hectare forest filters about 50-70 tons of dust per year. The forest is directly connected to improvement of the health of atmospheric air and protection of water resources, since oxygen is basically filled by photosynthesis. 1 hectare forest emits 10-15 times more oxygen than any phitocenosis.

In Georgia, air quality monitoring is conducted through a network of 15 automatic and 3 mobile stations distributed across 8 cities, continuously measuring pollutants including NO_2, SO_2, CO, $PM_{2.5}$, PM_{10}, and ozone. Furthermore, continuous monitoring of BTEX compounds (benzene, toluene, ethylbenzene, and xylenes) has been initiated at two automatic stations located in Batumi and Telavi.

The ozone layer, located in the stratosphere, is a vital part of the Earth's atmosphere. It represents a concentrated layer of ozone (O_3) gas that protects the Earth from the harmful effects of the sun's ultraviolet (UV) radiation.

Mechanism of Ozone Formation

The ozone layer in the stratosphere is constantly being created and destroyed, which is part of a natural cycle:

Formation: Solar ultraviolet (UV) radiation breaks down oxygen (O_2) molecules into two free oxygen atoms (O).

Ozone Formation: These free atoms then combine with other oxygen (O_2) molecules to form an ozone (O_3) molecule.

Protection and Breakdown: The ozone molecule absorbs harmful UV radiation, breaking down into an oxygen molecule (O_2) and a free atom (O), after which the cycle begins anew. This constant process creates a dynamic equilibrium that sustains the ozone layer.

Key Functions:

Absorption of Harmful Ultraviolet Radiation: The ozone layer absorbs the vast majority of the Sun's UVB and UVC radiation. This radiation is harmful to living organisms because it causes skin cancer, cataracts, and weakens the immune system in humans, and damages plants and marine ecosystems.

Regulation of Earth's Temperature: Ozone, like other greenhouse gases, contributes to regulating the temperature of the Earth's surface.

Ozone Layer Depletion

Since the 1970s, scientists have observed the thinning of the ozone layer, particularly over Antarctica, which is known as the "ozone hole." This process is caused by human-produced chemicals called Ozone-Depleting Substances (ODS), including:

Chlorofluorocarbons (CFCs), which were used in aerosol sprays, refrigerators, and air conditioners.

Halons and other similar compounds.

These substances reach the upper layers of the atmosphere, where they break down under the influence of sunlight, releasing chlorine and bromine atoms. It is these atoms that break down ozone molecules.

International Response

To protect the ozone layer, 198 countries signed the Montreal Protocol in 1987. Under this agreement, countries committed to the gradual reduction of the production and consumption of ozone-depleting substances. The Montreal Protocol is considered one of the most successful international environmental agreements.

Following the adoption of the Montreal Protocol, the ozone layer is slowly recovering, and scientists predict that it will return to 1980 levels by around 2060.

Definition of terms used in tables

Captured hazardous substances	Amount of hazardous substances captured with gas cleaning and dust collection equipment from hazardous substance generated in stationary sources. It does not include hazardous substances used in technological processes of production in form of raw materials or intermediate products.
Hazardous substances emitted into the atmosphere from stationary sources	Total amount of all hazardous substances emitted into the atmosphere as a result of incomplete filtration and cleaning by abatement equipment. This does not include hazardous materials generated as a result of erosion, forest fire, etc.
Stationary sources emitting hazardous substances into the atmosphere	These sources can be organized and non-organized; organized sources are immobile sources out of which hazardous substances are emitted from gas and air discharging systems (chimneys, ventilation devices, etc.). The system gives possibility to use gas cleaning and dust collection equipment, for decontamination of hazardous substances. The source is considered non-organized when hazardous substances directly go into the atmosphere due to non-hermetic protection of technological aggregates, loading systems (for example: places for loading cement, etc.).

Table 5.1. Number of stationary sources emitting hazardous substances

(unit)

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Number of stationary sources	2 986	2 944	3 022	3 002	3 138	3 296	3 789	3 882	4 007

Source: Ministry of Environment Protection and Agriculture of Georgia.

Table 5.2. Main indicators of generation of hazardous substances in stationary sources and protection of atmospheric air (thousand tons)

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Hazardous substances generated in stationary sources, total	**950.2**	**948.4**	**1346.9**	**1388.2**	**1375.5**	**849.5**	**794.7**	**912.8**	**946.3**
Captured hazardous substances	907.2	899.9	1307.9	1346.4	1317.4	793.2	734.6	853.4	876.8
Share of captured hazardous substances in total generated hazardous substances (%)	95.5	94.9	97.1	97.0	95.8	93.4	92.4	93.5	92.7

Source: Ministry of Environment Protection and Agriculture of Georgia.

Table 5.3. Captured and emitted hazardous substances generated in stationary sources

(thousand tons)

	Generated	Captured	Emitted	Share of captured hazardous substances, %
		2018		
Hazardous substances, total	**948.4**	**899.9**	**48.5**	**94.9**
Solid	898.7	893.1	5.6	99.4
Gaseous and liquid	49.7	6.8	42.9	13.7
Sulphur dioxide	5.8	0.0	5.8	0.1
Carbon monoxide	19.4	3.5	15.9	18.1
Nitrogen oxides	8.0	2.3	5.7	28.3
Hydrocarbons	2.1	0.0	2.1	0.0
Other	14.4	1.0	13.4	7.2
		2019		
Hazardous substances, total	**1346.9**	**1307.9**	**39.0**	**97.1**
Solid	1307.0	1301.9	5.1	99.6
Gaseous and liquid	39.9	5.9	34.0	14.9
Sulphur dioxide	1.8	0.0	1.8	0.4
Carbon monoxide	19.7	2.8	16.9	14.2
Nitrogen oxides	9.5	1.8	7.7	19.0
Hydrocarbons	1.7	0.0	1.7	0.0
Other	7.1	1.3	5.8	18.7
		2020		
Hazardous substances, total	**1388.2**	**1346.4**	**41.8**	**97.0**
Solid	1343.7	1338.3	5.4	99.6
Gaseous and liquid	44.5	8.1	36.4	18.2
Sulphur dioxide	1.9	0.0	1.9	0.5
Carbon monoxide	21.5	4.4	17.1	20.5
Nitrogen oxides	10.9	2.7	8.2	24.8
Hydrocarbons	1.8	0.0	1.8	0.0
Other	8.4	1.0	7.4	12.1
		2021		
Hazardous substances, total	**1375.5**	**1317.4**	**58.0**	**95.8**
Solid	1310.4	1304.5	5.8	99.6
Gaseous and liquid	65.1	12.9	52.2	19.8
Sulphur dioxide	2.2	0.0	2.1	1.2
Carbon monoxide	30.9	6.2	24.6	20.1
Nitrogen oxides	10.5	2.0	8.5	19.0
Hydrocarbons	1.8	0.0	1.8	0.3
Other	19.7	4.7	15.1	23.7

continued

	Generated	Captured	Emitted	Share of captured hazardous substances, %
		2022		
Hazardous substances, total	**849.5**	**793.2**	**56.2**	**93.4**
Solid	783.8	778.5	5.3	99.3
Gaseous and liquid	65.7	14.7	51.0	22.4
Sulphur dioxide	2.0	0.0	2.0	1.2
Carbon monoxide	30.5	7.3	23.1	24.1
Nitrogen oxides	12.1	2.3	9.8	18.9
Hydrocarbons	2.7	0.0	2.7	0.1
Other	18.4	5.1	13.3	27.6
		2023		
Hazardous substances, total	**794.7**	**734.6**	**60.0**	**92.4**
Solid	725.3	720.0	5.3	99.3
Gaseous and liquid	69.4	14.7	54.7	21.1
Sulphur dioxide	1.7	0.1	1.6	6.1
Carbon monoxide	32.3	6.0	26.2	18.7
Nitrogen oxides	12.5	2.5	10.0	20.2
Hydrocarbons	2.8	0.0	2.8	0.3
Other	20.1	6.0	14.1	29.8
		2024		
Hazardous substances, total	**912.8**	**853.4**	**59.4**	**93.5**
Solid	838.2	832.6	5.6	99.3
Gaseous and liquid	74.6	20.8	53.8	27.9
Sulphur dioxide	3.2	0.1	3.1	3.6
Carbon monoxide	29.2	6.2	23.0	21.2
Nitrogen oxides	13.8	2.5	11.3	18.2
Hydrocarbons	2.3	0.0	2.3	0.3
Other	26.1	12.0	14.0	46.1
		2025		
Hazardous substances, total	**946.3**	**876.8**	**69.4**	**92.7**
Solid	858.2	852.4	5.8	99.3
Gaseous and liquid	88.0	24.4	63.6	27.8
Sulphur dioxide	5.1	0.2	4.9	4.0
Carbon monoxide	31.5	6.3	25.2	20.0
Nitrogen oxides	18.0	3.0	15.0	16.6
Hydrocarbons	3.1	0.0	3.1	0.5
Other	30.3	14.9	15.4	49.2

Source: Ministry of Environment Protection and Agriculture of Georgia.

Table 5.4. Capture and emission of hazardous substances generated in stationary sources by regions (thousand tons)

	Generated	Captured	Emitted
	2017		
Georgia	**950.2**	**907.2**	**43.1**
Tbilisi	159.9	157.9	2.0
Adjara AR	2.0	0.7	1.3
Guria	6.3	5.4	1.0
Imereti	76.9	61.2	15.6
Kakheti	3.7	2.9	0.8
Mtskheta-Mtianeti	8.7	7.1	1.6
Racha-Lechkhumi and Kvemo Svaneti	0.3	0.2	0.1
Samegrelo-Zemo Svaneti	53.3	52.4	0.8
Samtskhe-Javakheti	1.9	1.6	0.2
Kvemo Kartli	347.9	335.5	12.3
Shida Kartli	289.4	282.1	7.3
	2018		
Georgia	**948.4**	**899.9**	**48.5**
Tbilisi	135.1	133.2	1.9
Adjara AR	1.8	0.6	1.1
Guria	2.5	1.4	1.1
Imereti	77.0	57.0	20.0
Kakheti	2.6	1.7	0.9
Mtskheta-Mtianeti	11.0	9.7	1.3
Racha-Lechkhumi and Kvemo Svaneti	0.6	0.5	0.1
Samegrelo-Zemo Svaneti	96.8	95.4	1.4
Samtskhe-Javakheti	1.5	1.3	0.2
Kvemo Kartli	342.4	329.1	13.3
Shida Kartli	277.1	270.0	7.1
	2019		
Georgia	**1346.9**	**1307.9**	**39.0**
Tbilisi	186.3	184.3	2.0
Adjara AR	2.2	1.0	1.2
Guria	5.7	4.7	1.0
Imereti	72.8	61.0	11.7
Kakheti	4.0	3.1	1.0
Mtskheta-Mtianeti	15.2	13.9	1.4
Racha-Lechkhumi and Kvemo Svaneti	0.6	0.5	0.1
Samegrelo-Zemo Svaneti	202.9	201.0	1.9
Samtskhe-Javakheti	3.5	3.2	0.3
Kvemo Kartli	326.5	313.3	13.1
Shida Kartli	527.2	521.8	5.4

continued

	Generated	Captured	Emitted
	2020		
Georgia	**1388.2**	**1346.4**	**41.8**
Tbilisi	151.8	149.1	2.7
Adjara AR	2.1	0.9	1.2
Guria	2.7	1.4	1.3
Imereti	82.1	71.2	10.8
Kakheti	5.2	3.7	1.5
Mtskheta-Mtianeti	10.1	8.6	1.5
Racha-Lechkhumi and Kvemo Svaneti	0.3	0.2	0.1
Samegrelo-Zemo Svaneti	200.4	198.9	1.5
Samtskhe-Javakheti	3.1	2.8	0.3
Kvemo Kartli	343.3	328.7	14.6
Shida Kartli	587.2	580.9	6.3
	2021		
Georgia	**1375.5**	**1317.4**	**58.0**
Tbilisi	145.9	143.5	2.5
Adjara AR	2.3	1.1	1.2
Guria	1.6	0.4	1.2
Imereti	75.6	56.8	18.8
Kakheti	6.2	5.4	0.8
Mtskheta-Mtianeti	7.4	5.7	1.7
Racha-Lechkhumi and Kvemo Svaneti	0.2	0.1	0.1
Samegrelo-Zemo Svaneti	180.3	178.7	1.6
Samtskhe-Javakheti	1.9	1.6	0.3
Kvemo Kartli	373.9	350.0	23.9
Shida Kartli	580.2	574.2	6.0
	2022		
Georgia	**849.5**	**793.2**	**56.2**
Tbilisi	139.0	136.6	2.3
Adjara AR	2.1	1.1	1.0
Guria	1.6	1.2	0.3
Imereti	68.3	49.4	18.9
Kakheti	4.1	3.1	1.0
Mtskheta-Mtianeti	5.0	3.9	1.1
Racha-Lechkhumi and Kvemo Svaneti	0.2	0.2	0.1
Samegrelo-Zemo Svaneti	74.8	72.9	1.8
Samtskhe-Javakheti	2.2	2.0	0.2
Kvemo Kartli	440.7	418.2	22.5
Shida Kartli	111.6	104.6	6.9

continued

	Generated	Captured	Emitted
	2023		
Georgia	**794.7**	**734.6**	**60.0**
Tbilisi	167.9	165.2	2.7
Adjara AR	2.0	1.0	1.0
Guria	0.9	0.6	0.4
Imereti	66.5	49.5	17.0
Kakheti	2.5	1.2	1.3
Mtskheta-Mtianeti	8.5	5.9	2.6
Racha-Lechkhumi and Kvemo Svaneti	0.2	0.1	0.1
Samegrelo-Zemo Svaneti	189.4	187.4	2.0
Samtskhe-Javakheti	3.6	2.4	1.2
Kvemo Kartli	253.6	229.1	24.5
Shida Kartli	99.5	92.2	7.3
	2024		
Georgia	**912.8**	**853.4**	**59.4**
Tbilisi	192.3	190.1	2.2
Adjara AR	2.1	1.1	1.0
Guria	0.7	0.5	0.2
Imereti	70.4	51.7	18.8
Kakheti	1.9	0.9	1.0
Mtskheta-Mtianeti	11.7	8.2	3.6
Racha-Lechkhumi and Kvemo Svaneti	0.1	0.1	0.1
Samegrelo-Zemo Svaneti	203.8	202.5	1.3
Samtskhe-Javakheti	0.8	0.5	0.3
Kvemo Kartli	327.3	304.2	23.1
Shida Kartli	101.7	93.6	8.0
	2025		
Georgia	**946.3**	**876.8**	**69.4**
Tbilisi	177.4	174.9	2.5
Adjara AR	2.8	1.4	1.4
Guria	0.5	0.3	0.2
Imereti	106.0	86.3	19.7
Kakheti	3.1	1.6	1.5
Mtskheta-Mtianeti	6.6	3.9	2.7
Racha-Lechkhumi and Kvemo Svaneti	0.1	0.1	0.0
Samegrelo-Zemo Svaneti	204.4	202.7	1.7
Samtskhe-Javakheti	1.3	0.8	0.5
Kvemo Kartli	324.4	302.9	21.5
Shida Kartli	119.6	102.0	17.6

Source: Ministry of Environment Protection and Agriculture of Georgia.

Table 5.5. Captured and emitted hazardous substances generated in stationary sources by cities

(thousand tons)

City	Hazardoous substances			Share of city,%	
	Generated	Captured	Emitted	In pollution of atmospheric air of region	In pollution of atmospheric air of country
			2018		
Tbilisi	135.1	133.2	1.9	100.0	4.0
Batumi	1.1	0.5	0.6	54.4	1.2
Gardabani	1.0	0.0	1.0	7.5	2.0
Zestaponi	50.3	41.2	9.1	45.6	18.8
Kaspi	262.9	257.0	5.9	82.3	12.1
Rustavi	325.1	318.1	7.0	52.7	14.4
Poti	93.6	93.0	0.6	38.4	1.1
Kutaisi	0.7	0.1	0.6	90.0	1.2
			2019		
Tbilisi	186.3	184.3	2.0	100.0	5.1
Batumi	1.6	0.8	0.8	66.0	1.9
Gardabani	1.9	0.5	1.4	10.8	3.6
Zestaponi	50.4	41.3	9.2	78.0	23.4
Kaspi	511.5	507.2	4.2	78.2	10.9
Rustavi	299.8	294.0	5.8	44.1	14.8
Poti	199.8	199.0	0.8	44.1	2.6
Kutaisi	4.5	4.1	0.4	3.6	1.1
			2020		
Tbilisi	151.8	149.1	2.7	100.0	6.5
Batumi	1.5	0.9	0.7	56.8	1.6
Gardabani	1.6	0.3	1.2	6.8	3.0
Zestaponi	50.4	41.3	9.1	84.4	21.9
Kaspi	579.1	574.3	4.9	76.7	11.6
Rustavi	308.5	303.3	5.2	35.4	12.3
Poti	197.1	196.5	0.6	40.4	1.5
Kutaisi	5.8	5.4	0.4	3.6	0.9
			2021		
Tbilisi	145.9	143.5	2.5	100.0	4.2
Batumi	1.7	1.0	0.7	61.8	1.3
Gardabani	1.1	0.2	0.9	3.8	1.7
Zestaponi	50.4	41.2	9.1	48.7	15.8
Kaspi	573.3	568.7	4.7	77.4	8.1
Rustavi	329.5	322.1	7.4	31.1	12.8
Poti	176.1	175.6	0.5	33.2	0.9
Kutaisi	2.0	1.5	0.5	2.6	0.8
			2022		
Tbilisi	139.0	136.6	2.3	100.0	4.1
Batumi	1.8	1.0	0.8	78.2	1.4
Gardabani	1.7	0.0	1.7	7.4	3.0
Zestaponi	50.3	41.2	9.2	48.5	16.3
Kaspi	100.3	94.6	5.7	81.5	10.1
Rustavi	392.9	385.4	7.5	33.2	13.3
Poti	71.2	70.8	0.4	24.3	0.8
Kutaisi	0.8	0.4	0.3	1.8	0.6

continued

City	Hazardous substances			Share of city,%	
	Generated	Captured	Emitted	In pollution of atmospheric air of region	In pollution of atmospheric air of country
			2023		
Tbilisi	167.9	165.2	2.7	100.0	4.5
Batumi	1.6	0.9	0.7	73.5	1.2
Gardabani	1.7	0.0	1.7	7.0	2.8
Zestaponi	50.3	41.2	9.2	53.9	15.3
Kaspi	93.4	87.6	5.8	79.6	9.6
Rustavi	198.2	192.0	6.2	25.4	10.4
Poti	185.4	184.7	0.7	35.5	1.2
Kutaisi	1.0	0.6	0.4	2.3	0.7
			2024		
Tbilisi	192.3	190.1	2.2	100.0	3.6
Batumi	1.9	1.1	0.8	80.6	1.3
Gardabani	1.3	0.0	1.3	5.4	2.1
Zestaponi	51.0	41.2	9.8	52.4	16.6
Kaspi	97.1	89.3	7.8	96.8	13.1
Rustavi	252.7	239.2	13.5	58.4	22.7
Poti	201.1	200.8	0.4	27.8	0.6
Kutaisi	1.9	1.6	0.4	1.9	0.6
			2025		
Tbilisi	177.4	174.9	2.5	96.8	3.7
Batumi	2.5	1.4	1.1	83.0	1.6
Gardabani	1.2	0.0	1.1	5.3	1.7
Zestaponi	50.4	41.2	9.2	46.4	13.3
Kaspi	97.7	82.3	15.4	87.0	21.6
Rustavi	249.5	239.2	10.4	48.0	15.0
Poti	201.7	200.9	0.8	45.5	1.1
Kutaisi	0.8	0.5	0.2	1.2	0.4

Source: Ministry of Environment Protection and Agriculture of Georgia.

Table 5.6. Emission of hazardous substances from road transport by type of substances

(thousand tons)

Hazardous substances	2016	2017	2018	2019	2020	2021	2022	2023	2024
Carbon monoxide (CO)	41.7	39.0	36.9	36.5	34.6	37.4	40.5	41.6	45.0
Nitrogen dioxide (NO_2)	17.4	16.0	14.8	13.4	13.0	13.8	13.3	14.8	15.8
Hydrocarbons (NmVOC)	8.5	9.0	8.7	8.6	8.3	8.9	9.5	9.8	10.5
Particulate matter (PM_{10})	0.9	0.9	0.9	0.8	0.9	0.9	0.9	1.0	1.1
Particulate matter ($PM_{2.5}$)	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.7
Soot (BC)	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Ammonia (NH_3)	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7
Sulphur dioxide (SO_2)	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Other hazardous substances	3.8	3.5	3.3	3.1	2.9	3.1	3.2	3.4	3.7

Source: Ministry of Environment Protection and Agriculture of Georgia.

6. NATURAL HAZARDS AND VIOLATIONS OF LAW



The challenging terrain, geological, and climatic conditions in Georgia contribute to the frequency and scale of natural disasters. These events are often characterized by recurrence and a high risk of danger. A tragic example is the disaster that occurred in Shovi, Oni Municipality, on August 3, 2023.

On August 3, 2023, in the Bubistskali Gorge, a confluence of natural geological and hydrometeorological phenomena occurred (intense glacier melt, precipitation in the form of rain, rockfall collapse at the headwaters, landslide-erosive processes, and the passage of a mudflow), which led to the formation of an extreme mudflow torrent.

This process was facilitated by the recent elevated air temperature background, the intense melting of glaciers caused by climate change, and the accompanying atmospheric precipitation. The mobilized rockfall material and a portion of the glacial mass were transformed into a glacial mudflow torrent in the upper part of the gorge. The high-velocity torrent passing through the riverbed caused the scouring of the slope bases along both banks in the middle and lower sections of the gorge, leading to the formation and activation of so-called coastal-type landslide bodies.

It is noteworthy that new landslide-erosive centers of varying scales formed in practically all tributaries of the Bubistskali River. Thus, the solid-material flow formed in the upper reaches of the gorge was supplemented, before joining the Chanckhali River, by both landslide masses that collapsed as a result of bank erosion along the Bubistskali riverbed and detrital material transported from the tributaries.

Climate change and human interference in natural processes have a significant impact on the frequency and intensity of these events. These natural events pose serious threats to the population, infrastructure, and economy of the country, making their management a subject of particular importance.

In Georgia, the monitoring of geological (landslides, mudflows, etc.) and hydrometeorological (floods, storms, avalanches, hail, etc.) events is the responsibility of the National Environmental Agency. This agency conducts annual observations in high-risk zones and populated areas across the country.

The legal framework for environmental protection in Georgia encompasses a wide range of laws and regulations aimed at preserving natural resources, protecting biodiversity, and ensuring the sustainability of ecosystems.

One of the major areas of environmental violations in Georgia is related to atmospheric air pollution. Emissions of harmful substances from industrial enterprises are particularly problematic, in some cases resulting from exceedances of established emission limits, malfunctioning pollution control equipment, or non-compliance with environmental requirements. Illegal logging and the pollution of rivers and reservoirs are also significant concerns, with the latter in some cases caused by industrial waste and uncontrolled disposal of household waste. Another important issue is violations associated with mining activities, which cause damage to landscapes and the natural environment.

Managing these issues is an integral part of Georgia's environmental legislation. Natural disasters and environmental violations remain critical challenges for the country, requiring climate-adapted policies and strengthened monitoring efforts to address them effectively.

Definition of terms used in tables

Avalanche	A rapid flow of snow or land down a sloping surface.
Flash Flood	A sudden raise f water level caused by heavy rains and intensive snow melting.
Flood	An overflow of river water that submerges land (during heavy rains or melting of snow).
Hail	A form of solid precipitation that consists of ball or irregular lumps of ice.
Hurricane	Very strong wind, velocity of which exceeds 20 m/s and which causes strong storm on the sea and damage of buildings on the ground.
Landslide	A geological phenomenon which includes a wide range of ground movements, such as rockfalls and deep failure of slopes. Its primary driving force is the action of gravity.
Mudflow	A downhill movement of soft wet and debris, made fluid by rain or melted snow and often building up a great speed.

Table 6.1. Number of occurred geological phenomena (landslide, mudflow), human fatalities and vulnerable objects (unit)

Year	Landslide		Mudflow		Vulnerable objects		
	Number of landslides (activated or newly occurred)	Number of human fatalities	Number of mudflows (activated or newly occurred)	Number of human fatalities	Affected agricultural land (hectare)	Number of human settlements	Number of buildings
1995	670	6	250	12	179	274	195
1996	610	3	165	5	232	403	626
1997	871	2	335	7	337	458	227
1998	543	5	173	6	230	370	159
1999	56	1	27	-	138	157	314
2000	65	1	23	-	162	240	207
2001	75	-	26	-	128	191	127
2002	69	1	23	2	148	203	193
2003	71	3	28	-	107	90	207
2004	949	4	258	2	16 289	755	6 042
2005	603	-	155	4	7 590	473	3 682
2006	356	1	63	-	3 173	531	2 066
2007	136	-	104	-	1 389	269	707
2008	311	10	126	8	1 388	392	1 198
2009	323	1	193	3	8 232	521	2 696
2010	250	3	81	2	1 155	366	822
2011	94	3	37	8	652	181	463
2012	325	1	88	5	1 255	239	845
2013	336	-	93	-	1 413	739	1 269
2014	727	-	141	10	…	1 041	962
2015	936	4	167	19	…	931	1 014
2016	780	-	208	-	…	1 421	1 084
2017	845	-	165	-	…	1 587	1 353
2018	702	1	122	-	…	1 057	1 245
2019	849	-	146	-	…	1 089	814
2020	1 074	4	183	1	…	1 145	1 040
2021	1 107	-	203	-	…	1 477	1 268
2022	1 120	-	211	-	…	1 523	1 514
2023	1 360	-	229	34	…	1 545	3 972
2024	1 205	10	213	-	…	1 567	4 266
2025	1 063	-	177	-	…	1 589	4 008

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL National Environmental Agency.

Table 6.2. Number of occurred hydrometeorological hazards

(unit)

Hydrometeorological hazard	January	February	March	April	May	June	July	August	September	October	November	December	**Total**	Number of human fatalities
2019														
Flood and flash flood	-	-	-	1	13	9	6	-	5	1	-	-	**35**	-
Hurricane and squall	2	5	-	2	2	3	1	-	4	-	-	-	**19**	1
Hail	-	-	-	1	11	5	2	-	2	1	-	-	**22**	-
Heavy snow	-	-	-	-	-	-	-	-	-	-	-	-	**-**	-
Storm	-	-	-	-	-	-	-	2	-	-	-	-	**2**	2
Avalanche	-	-	1	-	-	-	-	-	-	-	-	-	**1**	1
2020														
Flood and flash flood	-	-	-	-	7	1	13	9	1	2	-	-	**33**	1
Hurricane and squall	-	-	-	1	4	2	6	-	-	-	-	-	**13**	-
Hail	-	-	-	2	5	6	8	1	1	-	-	-	**23**	-
Heavy snow	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Storm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Avalanche	-	3	1	-	1	-	-	-	-	-	-	-	**5**	7
2021														
Flood and flash flood	9	-	1	3	2	-	11	1	22	1	-	-	**50**	-
Hurricane and squall	-	-	-	1	3	-	4	4	6	1	-	2	**21**	-
Hail	-	-	-	3	5	2	5	5	5	-	-	-	**25**	-
Heavy snow	-	1	-	-	-	-	-	-	-	-	-	7	**8**	-
Storm	-	-	-	-	-	-	-	-	-	-	-	1	**1**	-
Avalanche	-	-	1	-	-	-	-	-	-	-	-	-	**1**	1
2022														
Flood and flash flood	-	-	-	1	3	8	5	2	-	3	-	-	**22**	-
Hurricane and squall	1	1	4	2	1	5	-	-	-	-	1	-	**15**	-
Hail	-	-	-	1	1	4	-	-	-	-	-	-	**6**	-
Heavy snow	4	-	1	-	-	-	-	-	-	-	-	-	**5**	-
Storm	2	-	-	1	-	-	-	-	-	-	-	-	**3**	-
Avalanche	-	-	-	-	-	-	-	-	-	-	-	-	**-**	-
2023														
Flood and flash flood	-	-	-	3	5	19	24	2	5	6	-	2	**66**	2
Hurricane and squall	16	-	6	1	1	3	9	2	6	1	3	17	**65**	4
Hail	-	-	-	7	-	6	3	3	6	-	-	-	**25**	-
Heavy snow	3	11	-	-	-	-	-	-	-	-	-	5	**19**	-
Storm	-	-	-	-	-	-	-	-	-	-	5	-	**5**	-
Avalanche	-	2	-	-	1	-	-	-	-	-	-	-	**3**	-
2024														
Flood and flash flood	-	2	-	-	6	6	3	4	1	2	2	-	**26**	2
Hurricane and squall	-	2	-	-	-	2	2	1	2	1	2	4	**16**	-
Hail	-	-	-	1	1	6	1	2	-	-	-	-	**11**	-
Heavy snow	1	-	-	-	-	-	-	-	-	1	2	5	**9**	-
Storm	-	-	-	-	-	-	-	-	-	-	-	2	**2**	-
Avalanche	1	2	1	-	-	-	-	-	-	-	-	-	**4**	2

continued

Hydrometeorological hazard	January	February	March	April	May	June	July	August	September	October	November	December	**Total**	Number of human fatalities
	2025													
Flood and flash flood	-	-	-	-	2	1	1	3	3	-	-	-	**10**	-
Hurricane and squall	2	2	-	-	2	-	1	2	1	-	-	1	**11**	-
Hail	-	-	1	1	7	2	-	-	-	-	-	-	**11**	-
Heavy snow	-	7	1	1	-	-	-	-	-	-	-	1	**10**	1
Storm	-	-	-	-	-	-		1	-	-	-	1	**2**	-
Avalanche	-	1	1	-	-	-	-	-	-	-	-	2	**4**	1

Source: Ministry of Environment Protection and Agriculture of Georgia.
LEPL National Environmental Agency.

Table 6.3. Revealed violations of law related to environmental protection by regions and violation types, 2025 (unit)

	Illegal logging	Violation of timber transportation rules	Violation of fishing rules	Violation of hunting rules	Violation of technical reglament of sawmills	Illegal mining	Violation of mining licence terms	Violation of atmospheric air legislation	Violation of water legislation	Violation of land legislation	Pollution of environment by waste disposal	Violation of permission terms/activity without permission	Other violations	Total revealed violations of law
Georgia	**884**	**549**	**804**	**874**	**484**	**385**	**799**	**7 356**	**327**	**584**	**2 721**	**343**	**520**	**16 630**
Tbilisi	-	3	9	10	1	-	23	3 571	8	31	328	45	68	**4 097**
Adjara AR	168	89	36	47	69	19	63	1 315	55	53	260	24	56	**2 254**
Guria	19	8	36	89	24	23	45	51	8	30	42	10	16	**401**
Imereti	115	67	116	141	63	86	172	998	10	14	93	21	22	**1 918**
Kakheti	321	154	44	42	52	100	128	248	70	164	402	114	74	**1 913**
Mtskheta-Mtianeti	20	25	230	76	4	33	56	51	38	82	447	15	65	**1 142**
Racha-Lechkhumi and Kvemo Svaneti	15	8	-	6	51	3	5	26	4	1	13	4	11	**147**
Samegrelo-Zemo Svaneti	76	83	162	295	109	36	86	83	30	17	101	17	57	**1 152**
Samtskhe-Javakheti	82	38	16	29	54	11	45	36	24	34	98	6	36	**509**
Kvemo Kartli	52	45	98	83	6	50	87	902	41	115	746	61	60	**2 346**
Shida Kartli	16	29	57	56	51	24	89	75	39	43	191	26	55	**751**

Source: Ministry of Environment Protection and Agriculture of Georgia.
Department of Environmental Supervision.