NATIONAL STATISTICS OFFICE OF GEORGIA

NATURAL RESOURCES OF GEORGIA AND ENVIRONMENTAL PROTECTION

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Natural Resources of Georgia and Environmental Protection 2021

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Notation keys:

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-	Magnitude nil
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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 2000-2021

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. Average temperature in January is +3°C (on Kolkheti Valley), and in August – +23°C-26°C. 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.

Georgia is on one of the first places among the former Soviet Union countries with internal waters (rivers, lakes, reservoirs, glaciers, underground waters, wetlands).

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).

Winter is mild and warm on the coast of the Black Sea. An average temperature in January is +5-7°C. 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.

Flora - Due to diversity of physical-geographic and climatic conditions, the flora of Georgia is very rich and miscelanous. 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 firms, 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	Social science, studies interrelations of human and nature and technical economic aspects of mentioned process.
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. Land cover by tenure and agricultural land categories

(on April 1, 2004, thousand hectares)

	Total area	Non-agricultural land	Agricultural land	Arable land	Permanent crops	Meadows	Pastures	Residential or farming facilities and yards
Total area*	**7 628.4**	**4 602.6**	**3 025.8**	**801.8**	**263.8**	**143.8**	**1 796.6**	**19.8**
Private land	**948.9**	**181.6**	**767.3**	**438.5**	**180.5**	**44.0**	**84.5**	**19.8**
State land	**6 679.5**	**4 421.0**	**2 258.5**	**363.3**	**83.3**	**99.8**	**1 712.1**	**-**
Agricultural organizations	2 822.3	650.2	2 172.1	358.8	76.1	92.7	1 644.5	-
Non-agricultural	3 857.2	3 770.8	86.4	4.5	7.2	7.1	67.6	-
Settlements	88.4	86.8	1.6	0.4	0.7	-	0.5	-
Protected areas	300.7	285.1	15.6	0.1	0.1	1.1	14.3	-
Forest	2 456.2	2 400.3	55.9	2.8	6.1	5.1	41.9	-
Industry, transport, communications, radio broadcasting, TV, energy, defence and other	171.9	159.1	12.8	1.2	0.3	0.9	10.4	-
Religious organizations	4.9	4.9	-	-	-	-	-	-
Water (including inland waters)	835.1	834.6	0.5	-	-	-	0.5	-

* Including territorial water of Autonomous Republic of Abkhazia and Tskhinvali region.

Source: State Department for Land Management of Georgia.

Table 1.2. Sown area of agricultural crops

(thousand hectares)

	2014	2015	2016	2017	2018	2019	2020	2021
Sown area, total	**274.9**	**263.7**	**240.0**	**220.3**	**207.1**	**203.0**	**209.9**	**211.8**
Grain and leguminous crops	213.0	198.9	180.0	161.9	153.2	152.4	161.5	164.8
Potato, vegetables and melons	41.2	43.8	38.9	37.0	34.3	32.1	31.5	30.8
Other crops	20.8	21.0	21.1	21.3	19.6	18.5	16.9	16.2

Source: National Statistics Office of Georgia.

Table 1.3. Agricultural land operated by agricultural holdings according to land use type

(on October 1, 2014, hectare)

	Agricultural land	Arable land	Land under permanent crops	Greenhouses	Natural meadows and pastures
Georgia	**787 714**	**377 445**	**109 567**	**699**	**300 004**
Tbilisi	2 817	2 159	258	15	385
Adjara AR	19 731	6 054	9 011	12	4 653
Guria	26 909	13 474	12 366	7	1 060
Imereti	65 737	51 033	8 831	462	5 410
Kakheti	315 499	133 099	33 117	53	149 230
Mtskheta-Mtianeti	20 829	12 253	1 238	25	7 313
Racha-Lechkhumi and Kvemo Svaneti	5 757	2 700	901	0	2 156
Samegrelo-Zemo Svaneti	66 662	36 608	27 003	24	3 027
Samtskhe-Javakheti	76 057	28 626	687	2	46 742
Kvemo Kartli	122 316	50 087	2 098	88	70 043
Shida Kartli	65 400	41 351	14 056	11	9 983

Source: National Statistics Office of Georgia.

Agricultural Census of Georgia 2014.

Table 1.4. Non-agricultural land operated by agricultural holdings and its structure

(on October 1, 2014, Hectare)

	Non-agricultural land	Buildings and yards	Woodland	Reservoirs for aquaculture	Other non-agricultural land
Georgia	**54 575**	**42 945**	**9 023**	**1 492**	**1 115**
Tbilisi	1 341	1 326	1	0	13
Adjara AR	2 212	1 497	468	7	240
Guria	3 844	2 893	637	166	149
Imereti	11 454	9 861	1 306	102	186
Kakheti	13 296	6 755	5 352	1 035	154
Mtskheta-Mtianeti	1 412	1 302	8	1	100
Racha-Lechkhumi and Kvemo Svaneti	964	901	27	19	17
Samegrelo-Zemo Svaneti	10 130	8 694	1 213	48	175
Samtskhe-Javakheti	2 076	2 042	2	25	7
Kvemo Kartli	4 249	4 161	6	41	42
Shida Kartli	3 597	3 512	3	49	33

Source: National Statistics Office of Georgia.

Agricultural Census of Georgia 2014.

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, junipoerus, 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.

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, 2021

(thousand hectares)

	Forest area
Forest area of Georgia	**3 059.0**
Forest area under the Abkhazia AR*	423.4
Forest area under the Forestry Agency of Adjara	149.6
Forest area under the Agency of Protected Areas**	503.7
Forest area under the National Forestry Agency***	1 982.3

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

** Including Autonomous Republic of Abkhazia and Tskhinvali region. In 2019, the forest areas under the Agency of Protected Areas was specified.

*** 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, 2021

(thousand hectares)

	Forest area	Of which covered by forest
Georgia	**3 059.0**	**2 801.3**
Forest Area of Abkhazia AR*	**423.4**	**423.4**
Forest area under the Forestry Agency of Adjara	**149.6**	**141.3**
Forest area under the Agency of Protected Areas**	**503.7**	**370.2**
Forest area under the National Forestry Agency***	**1 982.3**	**1 866.4**
Guria	85.3	82.2
Imereti	311.4	299.5
Kakheti	288.3	268.1
Mtskheta-Mtianeti	237.0	223.3
Racha-Lechkhumi and Kvemo Svaneti	284.3	271.1
Samegrelo-Zemo Svaneti	271.8	258.0
Samtskhe-Javakheti	121.9	117.4
Kvemo Kartli	145.0	132.0
Shida Kartli	237.3	214.8

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

** Including Autonomous Republic of Abkhazia and Tskhinvali region. In 2019, the forest areas under the Agency of Protected Areas was specified.

*** 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
2000	2.77	39.9
2005	2.77	39.9
2010	2.77	39.9
2015	2.70	38.8
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

* 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

	2005	2010	2015	2016	2017	2018	2019	2020	2021
Number of Employees (thousand persons)	2.0	0.7	1.0	1.0	0.9	0.9	0.8	0.8	0.8
Operating costs (thousand GEL)	3 237	6 574	15 529	16 063	20 242	24 770	24 345	27 974	31 523

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

Table 2.5. Forest and field fires

	2014	2015	2016	2017	2018	2019	2020	2021
Number of fire cases (unit)	69	83	51	87	23	120	145	59
Area covered by fire (hectare)	1 723	216	398	1 582	1 931	3 713	3 238	3 076

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, 2021

	Number of fire cases, unit	Area covered by fire, hectare
Georgia	**59**	**3 076**
Tbilisi	-	-
Adjara AR	-	-
Guria	2	8
Imereti	11	72
Kakheti	1	50
Mtskheta-Mtianeti	-	-
Racha-Lechkhumi and Kvemo Svaneti	10	134
Samegrelo-Zemo Svaneti	11	164
Samtskhe-Javakheti	1	2
Kvemo Kartli	6	30
Shida Kartli	2	12
Protected areas	**15**	**2 605**

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

(hectare)

Year	Forest restoration	Forest seeding and planting	Facilitating natural recovery of forest
2000	1 158	258	900
2005	74	10	64
2010	165	111	54
2015	142	21	121
2016	178	50	128
2017	156	44	112
2018	265	152	113
2019	201	15	186
2020	166	8	158
2021	638	5	633

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)

	2005	2010	2015	2016	2017	2018	2019	2020	2021
Georgia	**10**	**111**	**21**	**50**	**44**	**152**	**15**	**8**	**7**
Tbilisi	1	-	-	-	-	-	-	-	-
Adjara AR	1	-	7	2	3	3	4	7	5
Guria	-	-	-	19	-	2	3	-	-
Imereti	-	-	-	0	-	2	-	-	-
Kakheti	0	109	7	25	-	-	-	-	-
Mtskheta-Mtianeti	4	0	-	2	2	-	-	-	-
Racha-Lechkhumi and Kvemo Svaneti	-	-	-	-	-	0	-	-	-
Samegrelo-Zemo Svaneti	-	-	-	-	1	-	1	1	-
Samtskhe-Javakheti	-	2	7	0	38	144	4	-	-
Kvemo Kartli	-	-	0	1	-	-	0	-	-
Shida Kartli	4	-	0	1	-	1	-	-	-
Protected Areas	-	-	-	-	-	-	2	-	2

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)

	2005	2010	2015	2016	2017	2018	2019	2020	2021
Georgia	**64**	**54**	**121**	**128**	**112**	**113**	**186**	**158**	**633**
Tbilisi	-	-	-	-	-	-	-	-	-
Adjara AR	-	-	118	100	100	100	100	-	190
Guria	-	-	-	-	-	3	2	-	33
Imereti	-	-	-	-	12	-	23	20	317
Kakheti	-	54	-	-	-	-	0	-	-
Mtskheta-Mtianeti	-	-	-	-	-	-	-	-	26
Racha-Lechkhumi and Kvemo Svaneti	-	-	-	-	-	-	-	14	4
Samegrelo-Zemo Svaneti	4	-	-	-	-	-	-	-	-
Samtskhe-Javakheti	-	-	3	28	-	-	-	63	30
Kvemo Kartli	-	-	-	-	-	-	12	60	33
Shida Kartli	60	-	-	-	-	10	3	-	-
Protected Areas	-	-	-	-	-	-	45	-	-

Source: Ministry of Environment Protection and Agriculture of Georgia.

LEPL Agency of Protected Areas.

LEPL Forestry Agency of Adjara.

LEPL National Forestry Agency.

Table 2.10. Volume of felled timber

(cubic metre)

	2005	2010	2015	2016	2017	2018	2019	2020	2021
Georgia	**810 615**	**876 749**	**712 336**	**628 035**	**630 462**	**578 031**	**515 879**	**488 773**	**453 685**
Tbilisi	6 278	...	...	...	...	...	...	...	...
Adjara AR	73 007	77 868	75 510	65 422	69 034	58 631	58 490	58 828	52 809
Guria	56 384	16 193	12 269	8 526	13 185	9 268	5 039	4 121	4 072
Imereti	103 718	97 440	80 775	57 443	53 277	45 483	33 854	33 088	26 477
Kakheti	119 479	181 706	140 086	121 773	132 067	97 051	94 698	69 632	55 288
Mtskheta-Mtianeti	68 938	86 944	74 956	63 545	66 790	52 485	45 339	40 824	31 124
Racha-Lechkhumi and Kvemo Svaneti	52 713	37 148	60 919	59 145	49 523	50 114	34 466	39 313	35 398
Samegrelo-Zemo Svaneti	110 376	91 524	29 019	39 538	49 564	54 202	46 763	53 180	72 679
Samtskhe-Javakheti	123 253	94 374	89 170	79 784	81 956	102 682	95 045	88 132	79 814
Kvemo Kartli	44 100	89 704	52 496	44 222	42 799	34 343	45 566	36 536	36 868
Shida Kartli	52 369	103 848	76 661	71 284	58 267	58 257	41 288	49 948	44 304
Protected areas	**...**	**...**	**20 475**	**17 353**	**14 001**	**15 515**	**15 333**	**15 170**	**14 852**

Source: Ministry of Environment Protection and Agriculture of Georgia.

LEPL Agency of Protected Areas.

LEPL Forestry Agency of Adjara.

LEPL National Forestry Agency.

Table 2.11. Illegal logging

(cubic metre)

	2014	2015	2016	2017	2018	2019	2020	2021
Georgia	**45 915**	**44 612**	**28 586**	**35 022**	**32 494**	**38 387**	**16 998**	**11 541**
Tbilisi	…	…	…	…	…	38	22	13
Adjara AR	1 895	1 880	1 044	1 514	1 250	1 257	663	1 018
Guria	474	729	647	331	194	224	89	175
Imereti	9 105	3 087	3 958	4 539	6 947	410	1 043	494
Kakheti	565	18 686	9 568	9 685	5 769	1 517	2 416	1 622
Mtskheta-Mtianeti	20 498	1 576	993	447	362	988	551	93
Racha-Lechkhumi and Kvemo Svaneti	802	1 993	320	2 032	1 717	10 151	1 611	3 424
Samegrelo-Zemo Svaneti	2 291	1 766	2 119	3 928	1 562	8 023	823	945
Samtskhe-Javakheti	1 583	10 648	7 170	9 022	6 253	808	7 113	1 889
Kvemo Kartli	6 636	1 783	1 738	1 227	6 015	1 007	656	1 313
Shida Kartli	1 596	1 581	845	1 975	1 632	13 670	1 841	426
Protected areas	**472**	**883**	**185**	**324**	**793**	**295**	**170**	**130**

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

	2005	2010	2015	2016	2017	2018	2019	2020	2021
									Thousand USD
Total export	**49.5**	**-**	**15.1**	**11.9**	**15.9**	**0.5**	**-**	**22.2**	**-**
Armenia	0.2	-	-	-	-	-	-	-	-
China	-	-	-	-	-	-	-	-	-
Germany	-	-	0.2	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-	-
Iran	-	-	-	11.9	-	-	-	-	-
Israel	5.6	-	-	-	-	0.5	-	-	-
Italy	-	-	-	-	-	-	-	-	-
Latvia	-	-	-	-	-	-	-	-	-
Russia	-	-	-	-	-	-	-	-	-
Senegal	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-
Switzerland	-	-	9.0	-	-	-	-	-	-
Turkey	43.7	-	5.9	-	-	-	-	22.2	-
Ukraine	-	-	-	-	-	-	-	-	-
United Kingdom	-	-	-	-	-	-	-	-	-
USA	-	-	-	-	15.9	-	-	-	-
									Cubic metre
Total export	**559**	**-**	**126**	**15**	**200**	**1**	**-**	**116.2**	**-**
Armenia	1	-	-	-	-	-	-	-	-
China	-	-	-	-	-	-	-	-	-
Germany	-	-	3	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-	-
Iran	-	-	-	15	-	-	-	-	-
Israel	71	-	-	-	-	1	-	-	-
Italy	-	-	-	-	-	-	-	-	-
Latvia	-	-	-	-	-	-	-	-	-
Russia	-	-	-	-	-	-	-	-	-
Senegal	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-
Switzerland	-	-	90	-	-	-	-	-	-
Turkey	487	-	33	-	-	-	-	116.2	-
Ukraine	-	-	-	-	-	-	-	-	-
United Kingdom	-	-	-	-	-	-	-	-	-
USA	-	-	-	-	200	-	-	-	-

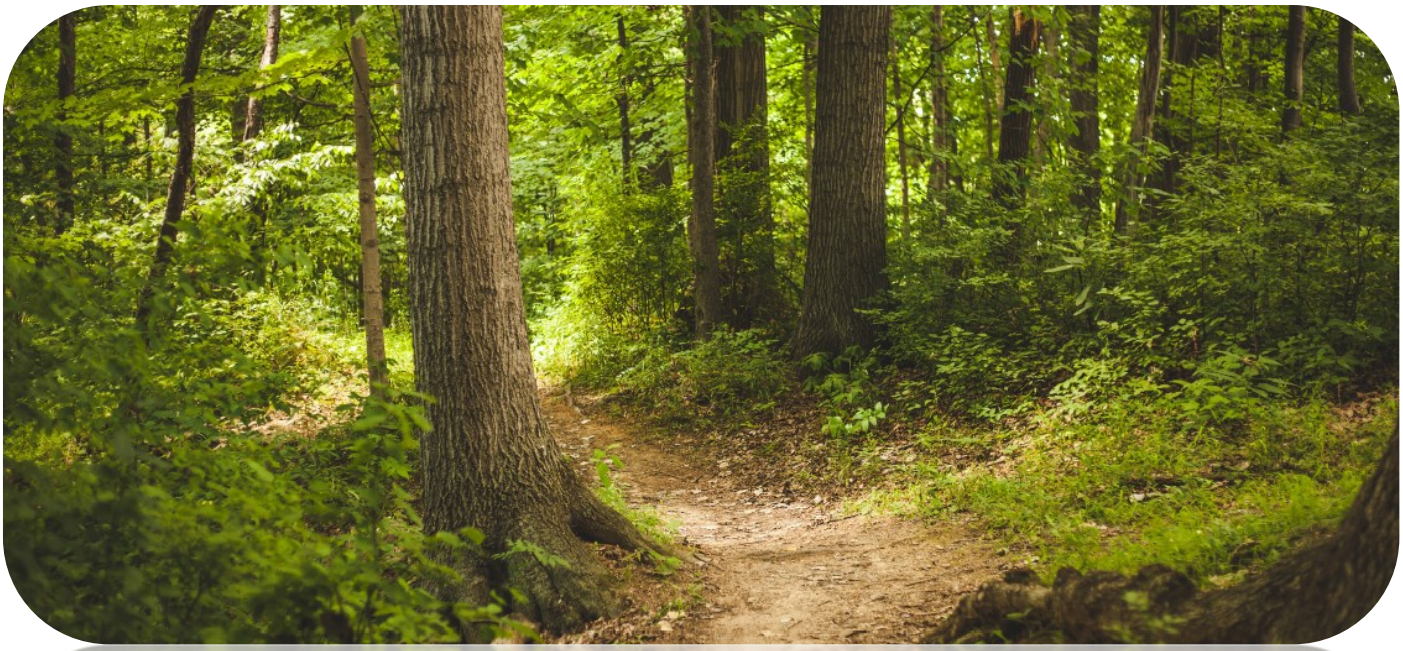
Source: National Statistics Office of Georgia.

Table 2.13. Import of non-processed timber

	2005	2010	2015	2016	2017	2018	2019	2020	2021
									Thousand USD
Total import	**632.3**	**2 222.8**	**4 058.3**	**3 043.1**	**4 019.4**	**5 448.1**	**5 015.9**	**3 091.7**	**5 360.7**
Belarus	-	-	-	-	198.2	144.9	-	-	-
Bulgaria	-	-	-	-	199.0	246.4	-	-	-
Canada	-	-	-	20.2	-	-	100.2	-	-
Czech Republic	-	-	1.8	-	-	0.4	-	-	-
Germany	-	-	-	221.3	815.9	2,624.4	3,781.4	2,874.8	5,360.7
Latvia	-	-	-	-	18.9	31.1	-	-	-
Lithuania	-	-	-	-	764.9	712.7	53.5	-	-
Poland	-	-	-	-	1,094.8	1,463.8	582.6	216.9	-
Russia	-	-	-	-	-	172.7	86.1	-	-
Slovakia	43.9	-	12.8	-	21.0	-	-	-	-
Turkey	-	-	-	15.8	-	40.7	412.1	0.0	0.0
Ukraine	588.4	1,655.8	4,043.8	2,785.8	906.7	10.9	-	-	-
United Kingdom	-	567.0	-	-	-	-	0.0	0.0	0.0
									Cubic metre
Total import	**8 430.0**	**18 803.0**	**27 052.0**	**23 114.0**	**25 377.0**	**30 901.0**	**37 494.5**	**26 705.5**	**40 132.1**
Belarus	-	-	-	-	1,160.0	785.0	-	-	-
Bulgaria	-	-	-	-	1,159.0	1,371.0	-	-	-
Canada	-	-	-	169.0	-	-	800.5	-	-
Czech Republic	-	-	3.0	-	-	1.0	-	-	-
Germany	-	-	-	1,130.0	4,697.0	14,494.0	30,547.9	24,927.7	40,132.1
Latvia	-	-	-	-	111.0	183.0	-	-	-
Lithuania	-	-	-	-	4,214.0	4,758.0	386.7	-	-
Poland	-	-	-	-	6,214.0	7,960.0	4,245.3	1,777.9	-
Russia	-	-	-	-	-	1,198.0	622.3	-	-
Slovakia	429.0	-	32.0	-	83.0	-	-	-	-
Turkey	-	-	-	32.0	-	85.0	891.9	0.0	0.0
Ukraine	8,001.0	17,915.0	27,017.0	21,783.0	7,739.0	65.0	-	-	-
United Kingdom	-	888.0	-	-	-	-	0.0	0.0	0.0

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. 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.

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.

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.
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, 2021

	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
	Under the supervision of Local Municipality:
	Tusheti Protected Landscape
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
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
8	**Administration of Kobuleti Protected Areas**
	Protected areas under supervision:
	Kobuleti Managed Reserve
	Kobuleti Strict Nature Reserve

continued

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**
12	**Administration of Algeti National Park**
	Protected areas under supervision:
	Algeti National Park
	Birtvisi Natural Monument
	Dashbashi Canyon Natural Monument
	Samshvilde Canyon Natural Monument
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

continued

15	**Administration of Kolkheti National Park**
	Protected areas under supervision:
	Katsoburi Managed Reserve
	Kolkheti National Park
	Ponto Oak Managed Reserve
16	**Administration of Ajameti Managed Reserve**
17	**Administration of 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**
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**
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**

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

Table 3.2. Protected areas of Georgia by categories, 2021

	Name	Total area, hectare
Protected areas, total*		**793 351**
	Area of strict nature reserves	**131 301**
1	Babaneuri	834
2	Batsara	3 036
3	Bichvinta-Miusera	3 645
4	Borjomi	13 169
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	12 627
14	Vashlovani	9 962
	Area of national parks	**445 768**
1	Algeti	8 768
2	Borjomi-Kharagauli	64 756
3	Erusheti	11 385
4	Javakheti	13 498
5	Kazbegi	78 204
6	Kintrishi	10 406
7	Kolkheti	44 309
8	Machakhela	7 333
9	Mtirala	15 699
10	Pshav-Khevsureti	75 843
11	Tbilisi	21 031
12	Tusheti	69 515
13	Vashlovani	25 021
	Area of managed reserves	**75 207**
1	Abuli Lake	211
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
11	Khanchali	727
12	Kobuleti	466
13	Korughi	1 716
14	Ktsia-Tabatskuri	20 476
15	Lagodekhi	4 500

continued

16	Madatapa	1 398
17	Nedzvi	9 213
18	Paravani Lake	4 031
19	Ponto Oak	443
20	Sagamo Lake	629
21	Sataplia	34
22	Sulda	309
23	Tetrobi	3 089
	Area of natural monuments**	**2 749**
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	Iazoni Cave	0
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	Nazodealo Cave	7
23	Ochkhomuri Waterfall	1
24	Okatse Canion	73
25	Okatse Waterfall	29
26	Oniore Waterfall and the First Toba Cave	97
27	Prometheus Cave	47
28	Roshka	122
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

continued

38	Tskaltsitela Gorge	12
39	Tsutskhvati Cave	9
40	White Cave	1
	Area of protected landscapes	**138 327**
1	Aragvi	99 802
2	Truso	7 007
3	Tusheti	31 518

* 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*, 2021

	Number, unit	Area, hectare
Strict nature reserves	14	131 301
National parks	12	445 767
Managed nature reserves	23	75 207
Natural monuments	40	2 749
Protected landscapes	3	138 327

* 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 animal species preserved in the protected areas

(unit)

Name	2005	2010	2015	2016	2017	2018	2019	2020	2021
Chamois	594	552	672	617	375	670	707	700	796
Badger	7 018	828	274	411	452	429	502	525	462
Brown bear	325	543	863	501	344	503	505	476	572
Fox	275	667	513	933	1 065	1053	560	381	856
Grey wolf	224	626	702	559	502	1038	495	381	501
Hare	551	3 599	559	589	309	1030	846	629	908
Hyena	...	1	6	...	8	...	...	...	1
Jackal	4 173	9 151	7 309	5 745	4 870	3524	3579	435	3 494
Lynx	63	85	111	95	88	134	119	101	121
Marten	1 816	1 598	827	875	1 000	416	321	475	824
Nutria	...	1 293	885	410	165	1000	1337	67	21
Otter	168	411	307	286	237	383	341	163	267
Red deer	299	554	877	955	1 047	993	922	1 220	1 169
Roe	1 372	2 613	2 263	3 507	2 609	3 892	3 858	1 801	4 039
Squirrel	50	1 667	333	843	598	555	416	695	729
East Caucasian (Daghestan) tur	695	1 455	1 689	1 068	708	1650	1384	2 073	2 529
Wild boar	320	892	966	1 127	794	1 390	1 261	1 006	621
Wild goat	170	150	419	418	457	563	551	628	515
Wildcat	2 507	511	88	143	216	270	230	629	186

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	2005	2010	2015	2016	2017	2018	2019	2020	2021
Black kite	50	17	39	33	1 577	300	146	873	4 140
Black stork	10	20	1 084	215	415	30	1 093	78	253
Blackbird	1 842	3 652	5 000	11 151	4 033	2 666	22 426	6 032	9 621
Caucasian grouse	982	845	966	966	1 017	1 308	1 119	1 230	1 422
Caucasian snowcock	766	645	886	505	568	594	508	684	620
Cinereous vulture	42	184	159	116	182	228	135	190	197
Common wood pigeon	375	362	...	1 190	1 332	1 985	6 186	639	4 864
Crow	150	35	2 000	2 674	1 360	1 400	2 820	377	7 679
Eastern imperial eagle	10	46	54	51	56	56	32	63	70
Eurasian jay	779	2 158	1 900	669	1 483	1 699	3 488	2 986	4 641
Eurasian woodcock	528	950	3 300	7 727	307	1 175	9 000	625	969
Falcon	16	18	62	83	67	120	205	107	92
Golden eagle	38	51	36	44	51	60	47	57	126
Goshawk	35	608	380	301	220	300	620	404	1 157
Grey partridge	100	...	…	…	...	...	...	15	97
Gyps	80	116	114	167	231	...	190	159	148
Mistle thrush	1 100	210	1 000	68	690	2 764	2 600	820	1 376
Nightingale	40	...	…	…	50	60	78	80	198
Owl	531	30	198	212	523	487	780	492	802
Pheasant	166	647	700	…	1 725	1 800	1 125	476	1 046
Rock partridge	2 120	4 670	2 235	…	3 106	2 100	1 500	3 759	2 938
Sparrowhawk	75	403	96	2 741	327	218	430	322	2 020
Tawny eagle	10	...	…	158	25	25	194	61	62
Woodpecker	504	2 311	871	15 788	...	591	559	525	1 482

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, 2021

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	**608**	**22**	**24**	**450**	**112**	**20 366.0**	**8 669.0**	**11 697.0**
Agency of Protected Areas	61	1	0	0	60	4 909.7	2 078.2	2 831.5
Ajameti Managed Nature Reserve	16	1	1	14	0	383.9	154.0	229.8
Algeti National Park	23	1	1	19	2	628.7	268.3	360.3
Batsara- Babaneuri Protected Areas	17	1	1	15	0	453.6	177.0	276.5
Borjomi-Kharagauli National Park	89	1	2	81	5	2 616.9	1 205.9	1 411.0
Chachuna Managed Nature Reserve	8	1	1	6	0	224.2	103.2	121.0
Erusheti National Park	16	1	1	13	1	132.5	53.1	79.3
Imereti Caves Protected Areas	26	1	1	19	5	1 253.9	598.3	655.6
Javakheti Protected areas	27	1	2	22	2	492.0	214.3	277.7
Kazbegi National Park	23	1	1	18	3	571.6	234.2	337.4
Kintrishi Protected Areas	11	1	1	7	2	289.6	117.8	171.8
Kobuleti Protected Areas	8	1	1	4	2	258.0	91.4	166.7
Kolkheti National Park	45	1	2	39	3	1 489.0	620.6	868.4
Lagodekhi Protected Areas	25	1	1	20	3	630.5	240.7	389.7
Machakhela National Park	18	1	1	13	3	453.5	182.2	271.3
Mariamjvari Strict Nature Reserve	11	1	1	9	0	297.9	125.8	172.1
Martvili and Okatse Natural Monument	28	1	1	21	5	961.0	439.3	521.7
Mtirala National Park	18	1	1	13	3	498.3	220.0	278.4
Pshav-Khevsureti National Park	26	1	1	21	3	678.0	280.5	397.5
Tbilisi National Park	42	1	1	37	3	1 207.1	519.9	687.2
Tusheti Protected Areas	34	1	1	27	5	790.1	304.8	485.3
Vashlovani Protected Areas	36	1	1	32	2	1 146.1	439.5	706.7

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.

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.

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.

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
Psou	89	885	The Black Sea
Ksani	84	885	The Caspian Sea
Dzirula	83	1 270	The Black Sea
Paravani	74	2 350	The Caspian Sea
Aragvi	66	2 740	The Caspian Sea
Mashavera	66	1 390	The Caspian Sea
Abasha	66	350	The Black Sea
Patara Liakhvi	63	513	The Caspian Sea
Natanebi	60	657	The Black Sea
Khanistskali	57	914	The Black Sea
Okumi	56	559	The Black Sea
Ghalidzga	53	483	The Black Sea
Tedzami	51	404	The Caspian Sea
Mokvi	50	356	The Black Sea
Chorokhi	26	22 100	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	12.5	52.0	4.6	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	52.0	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

	2015	2016	2017	2018	2019	2020	2021
	Percentage						
Population connected to water supply industry	59.5	62.5	65.5	65.8	67.7	68.9	71.3
Population connected to a wastewater collecting system	44.2	46.0	47.9	48.6	49.3	50.1	51.5
Population connected to wastewater treatment facilities	32.1	33.6	35.7	36.0	36.5	36.5	37.0
of which:							
Primary/mechanical treatment	28.6	29.7	31.1	31.0	0.5	0.4	0.4
Secondary/biological treatment	3.3	3.7	4.3	4.7	5.0	5.2	5.2
Tertiary/advanced treatment	0.2	0.2	0.2	0.2	30.9	30.9	31.4
	Million cubic metres						
Gross volume of water supplied by water supply industry	913.2	890.1	888.2	799.7	816.9	760.1	931.5
Losses of water during transport	668.6	637.4	625.5	531.0	543.4	491.6	677.9
Net volume of water supplied by water supply industry	244.6	252.7	262.7	268.6	273.5	268.6	253.6
Water supplied to households by water supply industry	207.6	213.7	223.4	221.9	223.4	229.2	210.1

Source: National Statistics Office of Georgia.

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

(million cubic metres)

	2016	2017	2018	2019	2020	2021
Water abstraction from natural water bodies, total*	**2 110.0**	**1 804.7**	**1 770.8**	**2 086.1**	**2 079.3**	**2 193.1**
Water abstraction from groundwater bodies	479.9	489.2	487.4	486.0	511.8	506.8
Water use, total*	**1 051.3**	**1 050.4**	**997.4**	**1 274.6**	**1 383.9**	**1 475.8**
Household needs	340.8	311.9	268.4	280.5	256.6	236.5
Industrial needs	262.4	247.2	263.5	389.4	402.7	394.0
Other needs	448.1	491.3	465.6	604.8	724.5	845.3
Wastewater discharge into surface water bodies, total	**389.0**	**344.0**	**334.5**	**401.6**	**280.8**	**246.3**
Polluted wastewater	158.5	131.7	112.8	187.3	86.5	76.2
Losses of water during transport	**1 058.6**	**754.3**	**773.4**	**811.5**	**695.3**	**717.3**
Cycling and secondary water supply	**190.3**	**207.9**	**121.9**	**135.0**	**315.2**	**307.1**

* 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.

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)

	2005	2010	2015	2016	2017	2018	2019	2020	2021
Number of stationary sources	153	1 099	2 695	2 891	2 986	2 944	3 022	3 002	3 138

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)

	2005	2010	2015	2016	2017	2018	2019	2020	2021
Hazardous substances generated in stationary sources, total	**57.3**	**661.0**	**802.2**	**772.5**	**950.3**	**871.2**	**1164.4**	**1203.0**	**1241.7**
Captured hazardous substances	33.2	630.7	757.3	728.0	907.3	822.7	1125.4	1157.6	1178.2
Share of captured hazardous substances in total generated hazardous substances (%)	57.9	95.4	94.4	94.2	95.5	94.4	96.6	96.2	94.9

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, %
		2005		
Hazardous substances, total	**57.3**	**33.2**	**24.1**	**57.9**
Solid	34.5	29.6	4.9	85.8
Gaseous and liquid	22.8	3.6	19.2	15.8
Sulphur dioxide	0.9	-	0.9	-
Carbon monoxide	12.1	2.6	9.5	21.5
Nitrogen oxides	2.8	0.7	2.1	25.0
Hydrocarbons	6.6	-	6.6	-
Other	0.4	0.3	0.1	75.1
		2010		
Hazardous substances, total	**661.0**	**630.7**	**30.1**	**95.4**
Solid	631.6	628.0	3.7	99.4
Gaseous and liquid	29.3	2.8	26.5	9.6
Sulphur dioxide	1.8	-	1.8	-
Carbon monoxide	15.1	1.5	13.7	10.0
Nitrogen oxides	4.0	1.0	3.0	25.0
Hydrocarbons	7.5	-	7.5	-
Other	1.0	0.4	0.5	40.0
		2015		
Hazardous substances, total	**802.2**	**757.3**	**44.9**	**94.4**
Solid	758.2	752.6	5.6	99.3
Gaseous and liquid	44.0	4.7	39.3	10.7
Sulphur dioxide	6.3	0.1	6.2	2.1
Carbon monoxide	17.5	2.4	15.0	14.0
Nitrogen oxides	7.3	1.2	6.1	15.8
Hydrocarbons	9.7	0.1	9.6	1.3
Other	3.2	0.8	2.4	25.8
		2016		
Hazardous substances, total	**772.5**	**728.0**	**44.5**	**94.2**
Solid	728.8	724.0	4.8	99.3
Gaseous and liquid	43.6	3.9	39.7	9.0
Sulphur dioxide	5.8	0.0	5.8	0.0
Carbon monoxide	18.8	2.5	16.3	13.3
Nitrogen oxides	6.0	0.6	5.4	9.4
Hydrocarbons	10.7	0.0	10.7	0.0
Other	2.4	0.9	1.5	37.2

continued

	Generated	Captured	Emitted	Share of captured hazardous substances, %
		2017		
Hazardous substances, total	**950.3**	**907.3**	**43.1**	**95.5**
Solid	907.2	902.2	5.1	99.4
Gaseous and liquid	43.1	5.1	38.0	11.8
Sulphur dioxide	6.3	0.2	6.1	3.1
Carbon monoxide	19.0	2.9	16.1	15.1
Nitrogen oxides	6.3	1.0	5.4	15.2
Hydrocarbons	1.9	0.0	1.9	0.3
Other	9.6	1.1	8.6	11.5
		2018		
Hazardous substances, total	**871.2**	**822.7**	**48.5**	**94.4**
Solid	821.5	815.9	5.6	99.3
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	**1164.4**	**1125.4**	**39.0**	**96.6**
Solid	1124.5	1119.4	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	**1203.0**	**1157.6**	**45.4**	**96.2**
Solid	1154.9	1149.5	5.4	99.5
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	**1241.7**	**1178.2**	**63.5**	**94.9**
Solid	1167.7	1161.9	5.9	99.5
Gaseous and liquid	74.0	16.3	57.6	22.1
Sulphur dioxide	2.2	0.4	1.7	20.3
Carbon monoxide	31.2	7.3	23.9	23.4
Nitrogen oxides	10.5	4.8	5.7	45.8
Hydrocarbons	1.8	0.0	1.8	0.3
Other	28.3	3.8	24.5	13.4

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
	2005		
Georgia	**57.3**	**33.2**	**24.1**
Tbilisi	3.0	0.1	2.9
Adjara AR	4.1	0.0	4.0
Guria	-	-	-
Imereti	27.8	19.2	8.6
Kakheti	0.0	0.0	0.0
Mtskheta-Mtianeti	0.8	0.4	0.4
Racha-Lechkhumi and Kvemo Svaneti	-	-	-
Samegrelo-Zemo Svaneti	0.3	-	0.3
Samtskhe-Javakheti	0.0	0.0	0.0
Kvemo Kartli	10.2	5.4	4.8
Shida Kartli	11.0	8.2	2.8
	2010		
Georgia	**661.0**	**630.7**	**30.1**
Tbilisi	26.0	24.8	1.2
Adjara AR	4.2	2.1	2.1
Guria	0.0	-	0.0
Imereti	20.5	5.7	14.8
Kakheti	3.8	3.3	0.5
Mtskheta-Mtianeti	8.7	8.3	0.4
Racha-Lechkhumi and Kvemo Svaneti	0.0	-	0.0
Samegrelo-Zemo Svaneti	5.4	4.3	1.1
Samtskhe-Javakheti	0.5	0.4	0.1
Kvemo Kartli	355.0	349.0	6.0
Shida Kartli	237.0	232.8	4.2
	2015		
Georgia	**802.2**	**757.3**	**44.9**
Tbilisi	85.5	83.6	1.9
Adjara AR	1.3	0.3	1.0
Guria	5.9	5.3	0.6
Imereti	50.7	37.2	13.5
Kakheti	7.0	2.5	4.5
Mtskheta-Mtianeti	9.8	8.6	1.2
Racha-Lechkhumi and Kvemo Svaneti	0.5	0.4	0.1
Samegrelo-Zemo Svaneti	13.1	8.7	4.4
Samtskhe-Javakheti	1.2	1.0	0.2
Kvemo Kartli	338.3	328.3	10.0
Shida Kartli	289.0	281.4	7.6

continued

	Generated	Captured	Emitted
	2016		
Georgia	**772.5**	**728.0**	**44.5**
Tbilisi	59.5	57.7	1.8
Adjara AR	6.4	5.2	1.2
Guria	3.3	2.3	1.0
Imereti	71.6	56.3	15.3
Kakheti	5.5	2.7	2.8
Mtskheta-Mtianeti	8.1	6.1	2.0
Racha-Lechkhumi and Kvemo Svaneti	0.3	0.2	0.1
Samegrelo-Zemo Svaneti	2.2	1.0	1.2
Samtskhe-Javakheti	1.4	1.2	0.2
Kvemo Kartli	337.6	326.4	11.3
Shida Kartli	276.6	268.9	7.7
	2017		
Georgia	**950.3**	**907.3**	**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	348.0	335.6	12.3
Shida Kartli	289.4	282.1	7.3
	2018		
Georgia	**871.2**	**822.7**	**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	23.9	22.5	1.4
Samtskhe-Javakheti	1.5	1.3	0.2
Kvemo Kartli	338.1	324.8	13.3
Shida Kartli	277.1	270.0	7.1

continued

	Generated	Captured	Emitted
	2019		
Georgia	**1164.4**	**1125.4**	**39.0**
Tbilisi	183.9	181.9	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	35.2	33.3	1.9
Samtskhe-Javakheti	3.5	3.2	0.3
Kvemo Kartli	314.1	301.0	13.1
Shida Kartli	527.2	521.8	5.4
	2020		
Georgia	**1203.0**	**1157.6**	**45.4**
Tbilisi	149.4	146.7	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	33.5	32.0	1.5
Samtskhe-Javakheti	3.1	2.8	0.3
Kvemo Kartli	327.5	309.2	18.2
Shida Kartli	587.2	580.9	6.3
	2021		
Georgia	**1241.7**	**1178.2**	**63.5**
Tbilisi	172.1	169.6	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	16.2	5.7	10.5
Racha-Lechkhumi and Kvemo Svaneti	0.2	0.1	0.1
Samegrelo-Zemo Svaneti	32.1	30.5	1.6
Samtskhe-Javakheti	1.9	1.6	0.3
Kvemo Kartli	353.3	329.4	23.9
Shida Kartli	580.2	577.6	2.6

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	Hazardopus substances			Share of city,%	
	Generated	Captured	Emitted	In pollution of atmospheric air of region	In pollution of atmospheric air of country
			2015		
Tbilisi	85.5	83.6	1.9	100.0	4.2
Batumi	1.1	0.3	0.8	84.7	1.8
Gardabani	1.8	0.0	1.8	18.0	4.0
Zestaponi	37.3	29.0	8.3	62.0	18.6
Kaspi	273.5	267.1	6.4	84.1	14.2
Rustavi	325.5	318.8	6.8	67.8	15.1
Poti	8.0	7.5	0.5	10.9	1.1
Kutaisi	0.3	0.0	0.3	2.0	0.6
			2016		
Tbilisi	59.5	57.7	1.8	100.0	4.0
Batumi	5.5	4.5	0.9	78.4	2.1
Gardabani	0.9	0.0	0.9	8.0	2.0
Zestaponi	50.3	41.2	9.1	59.6	20.5
Kaspi	257.3	251.6	5.7	74.9	12.9
Rustavi	325.3	319.5	5.8	51.6	13.1
Poti	0.7	0.4	0.3	22.4	0.6
Kutaisi	1.3	1.0	0.2	1.6	0.5
			2017		
Tbilisi	159.9	157.9	2.0	100.0	4.5
Batumi	1.4	0.5	0.9	71.0	2.2
Gardabani	1.2	0.0	1.2	9.3	2.7
Zestaponi	50.3	41.2	9.1	58.5	21.2
Kaspi	272.9	266.9	6.0	82.6	14.0
Rustavi	333.8	327.7	6.1	49.2	14.1
Poti	51.2	50.9	0.3	38.8	0.8
Kutaisi	0.5	0.1	0.4	2.3	0.8
			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	324.6	317.6	7.0	52.7	14.4
Poti	20.7	20.2	0.6	38.4	1.1
Kutaisi	0.7	0.1	0.6	90.0	1.2

continued

City	Hazardopus substances			Share of city,%	
	Generated	Captured	Emitted	In pollution of atmospheric air of region	In pollution of atmospheric air of country
			2019		
Tbilisi	183.9	181.9	2.0	100.0	5.1
Batumi	1.6	0.8	0.8	66.0	1.9
Gardabani	1.9	0.5	1.4	108.0	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	299.0	293.3	5.8	44.2	14.8
Poti	32.1	31.3	0.8	44.1	2.2
Kutaisi	4.5	4.1	0.4	3.6	1.1
			2020		
Tbilisi	149.4	146.7	2.7	100.0	6.0
Batumi	1.5	0.9	0.7	56.8	1.5
Gardabani	1.6	0.3	1.2	6.8	2.7
Zestaponi	50.4	41.3	9.1	84.4	20.1
Kaspi	579.1	574.3	4.9	76.7	10.7
Rustavi	307.9	302.8	5.2	28.3	11.4
Poti	30.2	29.6	0.6	40.4	1.4
Kutaisi	5.8	5.4	0.4	3.6	0.9
			2021		
Tbilisi	172.1	169.6	2.5	100.0	3.9
Batumi	1.7	1.0	0.7	62.4	1.2
Gardabani	1.2	0.2	1.0	4.0	1.5
Zestaponi	50.4	41.2	9.1	48.7	14.4
Kaspi	573.3	572.1	1.3	47.9	2.0
Rustavi	328.9	321.5	7.4	31.1	11.7
Poti	27.9	27.4	0.5	33.2	0.8
Kutaisi	2.0	1.5	0.5	2.6	0.8

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	2012	2013	2014	2015	2016	2017	2018	2019	2020
Carbon oxides (CO)	39.7	37.3	52.4	57.3	68.2	63.9	60.6	60.3	57.4
Nitrogen oxides (NO_2)	13.5	15.0	20.8	23.5	25.5	23.4	21.8	20.0	19.2
Hydrocarbons (NmVOC)	6.5	6.4	9.1	9.9	11.2	10.8	10.4	10.4	10.1
Patriculate matters (PM_{10})	0.7	0.7	0.9	1.0	1.1	1.0	1.0	0.9	1.0
Patriculate matters ($PM_{2.5}$)	0.5	0.6	0.7	0.8	0.9	0.8	0.8	0.7	0.7
Soot (BC)	0.2	0.2	0.3	1.1	1.2	1.2	1.1	1.1	1.1
Ammonia (NH_3)	0.5	0.4	0.4	0.5	0.7	0.6	0.6	0.6	0.6
Sulphur dioxide (SO_2)	0.4	0.4	0.3	0.3	0.2	0.1	0.1	0.1	0.1
Other hazardous substances	1.7	1.7	2.3	2.6	3.0	2.7	2.6	2.5	2.4

Source: Ministry of Environment Protection and Agriculture of Georgia.

6. NATURAL HAZARDS AND VIOLATIONS OF LAW

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	-	...	1 644	1 245
2019	849	-	146	-	...	1 542	814
2020	1 074	4	183	1	...	1 774	1 040
2021	1 107	-	203	-	...	1 876	1 268

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
2015														
Flood and flash flood	-	-	-	1	2	4	1	-	-	1	1	-	**10**	**22**
Hurricane and squall	2	1	-	-	-	-	-	-	-	-	4	2	**9**	**1**
Hail	-	-	-	2	6	9	3	1	-	1	-	-	**22**	**-**
Heavy snow	2	-	-	-	-	-	-	-	-	-	-	-	**2**	**-**
Storm	-	-	-	-	-	-	-	-	-	-	-	-	**-**	**-**
Avalanche	3	-	-	-	-	-	-	-	-	-	-	-	**3**	**2**
2016														
Flood and flash flood	1	-	-	1	-	5	15	1	2	-	-	1	**26**	**-**
Hurricane and squall	-	4	1	5	-	2	1	4	4	-	1	1	**23**	**-**
Hail	-	-	-	-	16	11	3	4	-	2	-	-	**36**	**-**
Heavy snow	8	-	1	-	-	-	-	-	-	1	2	4	**16**	**-**
Storm	-	-	-	-	-	-	-	-	-	-	-	-	**-**	**-**
Avalanche	-	-	-	-	1	-	-	-	-	-	1	3	**5**	**2**
2017														
Flood and flash flood	-	-	-	-	8	6	10	2	4	5	-	1	**36**	**-**
Hurricane and squall	2	2	3	4	2	2	2	2	2	2	-	2	**25**	**1**
Hail	-	-	-	1	9	3	4	-	2	-	-	-	**19**	**-**
Heavy snow	2	-	-	-	-	-	-	-	-	-	-	-	**2**	**2**
Storm	-	-	-	-	-	-	-	-	-	-	-	-	**-**	**-**
Avalanche	4	4	4	1	2	-	-	-	-	-	-	3	**18**	**3**
2018														
Flood and flash flood	1	-	-	-	-	10	6	10	1	1	-	-	**29**	**-**
Hurricane and squall	4	-	1	4	-	-	-	1	-	1	-	5	**16**	**-**
Hail	-	-	1	-	4	1	-	2	2	-	-	-	**10**	**-**
Heavy snow	-	-	-	-	-	-	-	-	-	-	-	-	**-**	**-**
Storm	-	-	-	-	-	-	-	-	1	-	-	-	**1**	**-**
Avalanche	1	-	-	-	-	-	-	-	-	-	-	-	**1**	**-**
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**

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, 2021 (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
Georgia	**1 837**	**1 404**	**353**	**152**	**607**	**434**	**...**	**744**	**174**	**228**	**1 385**	**444**	**207**
Tbilisi	1	5	40	3	1	2	...	86	7	11	97	50	28
Adjara AR	165	94	14	8	59	91	...	102	22	17	718	37	11
Guria	25	19	3	4	32	16	...	14	6	45	67	17	7
Imereti	242	182	48	75	56	133	...	136	14	27	91	75	19
Kakheti	791	465	54	16	92	37	...	143	21	24	57	21	45
Mtskheta-Mtianeti	47	26	43	1	10	27	...	22	32	34	72	36	12
Racha-Lechkhumi and Kvemo Svaneti	39	41	3	4	88	14	...	27	7	8	11	9	9
Samegrelo-Zemo Svaneti	92	177	31	15	130	35	...	48	15	12	28	58	24
Samtskhe-Javakheti	242	128	17	12	54	13	...	27	17	17	30	35	6
Kvemo Kartli	150	153	61	10	4	39	...	114	11	21	176	72	29
Shida Kartli	43	114	39	4	81	27	...	25	22	12	38	34	17

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