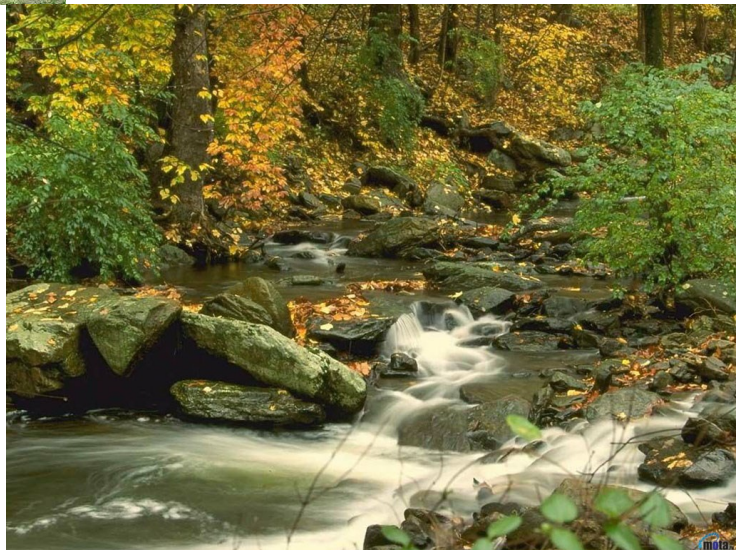




**NATURAL RESOURCES OF  
GEORGIA AND  
ENVIRONMENTAL PROTECTION**

**2016**

**STATISTICAL PUBLICATION**



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## Natural Resources of Georgia and Environmental Protection, 2016

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## Foreword

The present statistical publication, “Natural Resources of Georgia and Environmental Protection” provides information about use and protection of land, forest and water resources, protected areas, natural hazards and violations of law related to environmental protection. It also presents some methodological explanations and information from different scientific sources.

The data given in the publication reflect the main trends in the field of natural resources of Georgia and environmental protection activities in 1995-2016.

### Notation keys:

...	No data
-	Event does not exist
0.0	Negligible magnitude

The discrepancy between the totals and the sum in some cases can be explained by using rounded data.

The data in this publication do not cover occupied territories of Autonomous Republic of Abkhazia and Tskhinvali region.

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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. 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 south west - 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 5 068.8 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, especially in western Georgia, where annual amount of precipitation is 2 800 mm, while in eastern Georgia it is only 300 mm.

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, non ferrous and rare metals, mining and chemical raw materials, inert materials and other mines.

### Ground Waters

Ground waters have a great importance in the mineral treasure of Georgia. They are very important for development of national economy of the country is highly dependent on the ground water. Georgia is also rich in thermal waters that can have a wide range of use in agriculture and energy sector.

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.



### 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. The majority of lakes in Georgia are fresh water, and part of them contains very little salt. The largest lake in area in Georgia is Lake Paravani, in volume – Lake Tabatskuri, in depth – Lake Ritsa, that it 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 734 **glaciers** in Georgia and they all are located in the Caucasus Mountains. Their cumulative area is 511 square kilometres that is 0.7 % of the country territory.

**Wetlands** in Georgia are located on the Kolkheti Valley and its total area is 627 square kilometres. Georgia is bounded to the west by the **Black Sea**. The length of the coastline is 330 km. Within the territory of Georgia the following rivers flow into the Black Sea: Rioni, Bzipi, Kodori, Enguri and Chorokhi.

Winter is **mild and warm** on the coast of the Black Sea. An average temperature in January is + 4-7°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‰ (in spring) to 18.3‰ (in winter). From the surface to the depth of 200 metres the salinity increases up to 21.3‰. 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 2-4 miles from the coast.

### Flora

Due to diversity of physical-geographic and climatic conditions, the flora of Georgia is very rich and miscellaneous. Diversification of relief and complex configuration of mountain rings caused geographic and ecological isolation of ecosystems in Georgia and high level of local endemism. There are preserved some species in Georgian flora that became extinct in west Eurasia million years ago.

### 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.

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) 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

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

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

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.

## 1.1 Land cover by tenure and agricultural land categories

(On April 1, 2004)

Thousand hectare

	Total area	Non-agricultural land	Agricultural land	Arable land	Permanent crops	Meadows	Pastures	Residential or farming facilities and yards
<b>Total area*</b>	<b>7 628.4</b>	<b>4 602.6</b>	<b>3 025.8</b>	<b>801.8</b>	<b>263.8</b>	<b>143.8</b>	<b>1 796.6</b>	<b>19.8</b>
<b>Private land</b>	<b>948.9</b>	<b>181.6</b>	<b>767.3</b>	<b>438.5</b>	<b>180.5</b>	<b>44.0</b>	<b>84.5</b>	<b>19.8</b>
<b>State land</b>	<b>6 679.5</b>	<b>4 421.0</b>	<b>2 258.5</b>	<b>363.3</b>	<b>83.3</b>	<b>99.8</b>	<b>1 712.1</b>	<b>-</b>
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, other media, 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	-

Source: State Department for Land Management of Georgia.

Note: \* Including inland waters and occupied territories of Autonomous Republic of Abkhazia and Tskhinvali region.

## 1.2 Sown area of agricultural crops

	Thousand hectare		
	2014	2015	2016
<b>Sown area, total</b>	<b>274.9</b>	<b>263.7</b>	<b>240.0</b>
Grain and leguminous crops	213.0	198.9	180.0
Potato, vegetables and melons	41.2	43.8	38.9
Other crops	20.8	21.0	21.1

Source: National Statistics Office of Georgia.

## 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
<b>Georgia</b>	<b>787 714</b>	<b>377 445</b>	<b>109 567</b>	<b>699</b>	<b>300 004</b>
Tbilisi	2 817	2 159	258	15	385
Adjara A/R	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
Svaneti	5 757	2 700	901	0.0	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.

### 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
<b>Georgia</b>	<b>54 575</b>	<b>42 945</b>	<b>9 023</b>	<b>1 492</b>	<b>1 115</b>
Tbilisi	1 341	1 326	1	0.0	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
Svaneti	964	901	27	19.0	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 4.1 billion hectares in the world, i.e. about half 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 micro organisms 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.

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, fir, 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 and so on, etc.); the fourth and fifth ones consist of grass and moss cover. One can meet climbing plants and mosses, mushrooms and algae on the branches in the different tiers of forest.

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

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

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

On lowlands and foothill slopes of dry regions of eastern Georgia (Shiraki, Eldari, Mtskheta, etc.), up to 400 – 600 m above sea level light forests are spread, mostly composed of Georgian maple, pomegranate, pistacia, juniperus, etc. In lower zone of mountains (from 500 m to 900 – 1 000 m) there are oak and chestnut forests. Chestnuts are met in both eastern (Kakheti) and western Georgia. On lime soils of western Georgia and dry districts of eastern Georgia (Kartli, Gare Kakheti) oaks and hornbeams are spread instead of chestnuts. Medlar, hawthorn, cornel, nuts, 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. These forests are composed with the Eastern spruce and Caucasian fir, that form multiaged, 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 western 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 tonnes 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 phytomass is 10-30 tonnes on average, of vegetation – 9 tonnes and of tundra – 2 tonnes.

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 tonnes of dust annually, and consequently forests of Georgia filter about 135-190 million tonnes 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. 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 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 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.

Forest is a renewable natural resource – in case of a rational use, it retains and improves its natural features and ensures a proper change of generations. A miscellaneous importance, the length of growth, and the need for a rational use of forest determine specificity of relations between human and forest. 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**

<b><i>Forest</i></b>	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.
<b><i>Area covered by forest</i></b>	Area of 0.3 hectare and more, covered with trees higher than 2 meter or with bushes higher than 1.5 meter. Their canopy should cover 30 percent or more of the total area.
<b><i>Forest restoration</i></b>	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.
<b><i>Facilitating natural recovery of forest</i></b>	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.
<b><i>Forest area</i></b>	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.
<b><i>Timber felling</i></b>	Removing trees and shrubs from natural environment of forest.
<b><i>Illegal logging</i></b>	Felling the trees without permission.
<b><i>Operational expenses of the National Forestry Agency</i></b>	Expenditures on operation of the National Forestry Agency, such as: forest arrangements, forest restoration, development of forest protection lines, protecting forest from fire, pests, diseases, etc. as well as expenses on the office of the agency.

## 2.1 Forest area, 2016

	Thousand hectare
	Forest area
<b>Forest area of Georgia</b>	<b>2 632.9</b>
Forest area under the National Forestry Agency*	2 008.5
Forest area under the Forestry Agency of Adjara	150.1
Forest area under the Agency of Protected Areas**	474.3
Forest area under the Abkhazia AR	...

Source: Ministry of Environment and Natural Resources Protection of Georgia.

National Forestry Agency.

Forestry Agency of Adjara.

Agency of Protected Areas.

Note: \*Including occupied territories of Tskhinvali region.

\*\*Including occupied territories of Autonomous Republic of Abkhazia and Tskhinvali region.

## 2.2 Forest area of Georgia by regions, 2016

	Thousand hectare	
	Forest area	Of which covered by forest
<b>Georgia</b>	<b>2 632.9</b>	<b>2 344.1</b>
<b>Forest area under the Agency of Protected Areas*</b>	<b>474.3</b>	<b>318.6</b>
<b>Forest area under the Forestry Agency of Adjara</b>	<b>150.1</b>	<b>139.1</b>
<b>Forest area under the National Forestry Agency**</b>	<b>2 008.5</b>	<b>1 886.4</b>
Guria	86.3	82.9
Imereti	312.5	300.1
Kakheti	288.4	269.2
Mtskheta-Mtianeti	249.7	235.5
Racha-Lechkhumi and Kvemo Svaneti	282.0	268.0
Samegrelo-Zemo Svaneti	272.5	256.2
Samtskhe-Javakheti	133.4	127.8
Kvemo Kartli	146.4	133.4
Shida Kartli	237.3	213.3

Source: Ministry of Environment and Natural Resources Protection of Georgia.

National Forestry Agency.

Forestry Agency of Adjara.

Agency of Protected Areas.

Note: \*Including occupied territories of Autonomous Republic of Abkhazia and Tskhinvali region.

\*\*Including occupied territories of Tskhinvali region.

### 2.3 Area of Georgia covered by forest

Year	Area covered by forest*	
	Area, million hectare	Percentage share in the country territory
2000	2.77	39.7
2005	2.77	39.7
2010	2.77	39.7
2015	2.71	38.9
2016	2.69	38.6

Source: Ministry of Environment and Natural Resources Protection of Georgia.  
 National Forestry Agency.  
 Forestry Agency of Adjara.  
 Agency of Protected Areas.

Note: \* Including occupied territories of Abkhazia AR and Tskhinvali regions.

### 2.4 Number of employees and operating costs of the National Forestry Agency

	1995	2000	2005	2010	2015	2016
Number of Employees (thousand persons)	3.5	7.4	2.0	0.7	1.0	1.0
Operating costs (thousand GEL)	2 081	940	3 237	6 574	15 529	17 345

Source: Ministry of Environment and Natural Resources Protection of Georgia.

National Forestry Agency.

### 2.5 Forest and field fires

	1995	2000	2005	2010	2015	2016
Number of fire cases (unit)	1	34	23	21	72	42
Area covered by fire (hectare)	7	85	45	371	205	184

Source: Ministry of Environment and Natural Resources Protection of Georgia.

National Forestry Agency.

Note: Table includes forest area under the National Forestry Agency only.

## 2.6 Forest and field fires by regions, 2016

	Number of fire cases, unit	Area covered by fire, hectare
Guria	-	-
Imereti	24	133
Kakheti	-	-
Mtskheta-Mtianeti	-	-
Racha-Lechkhumi and Kvemo Svaneti	7	32
Samegrelo-Zemo Svaneti	4	8
Samtskhe-Javakheti	-	-
Kvemo Kartli	1	0.0
Shida Kartli	6	11

Source: Ministry of Environment and Natural Resources Protection of Georgia.  
National Forestry Agency.

Note: Table includes forest area under the National Forestry Agency only.

## 2.7 Forest restoration

Year	Forest restoration	Forest seeding and planting	Heactare
			Facilitating natural recovery of forest
1995	13 912	1 002	12 910
2000	1 158	258	900
2005	74	10	64
2010	165	111	54
2015	142	21	121
2016	178	50	128

Source: Ministry of Environment and Natural Resources Protection of Georgia.  
National Forestry Agency.  
Forestry Agency of Adjara.



## 2.8 Forest seeding and planting

	Hectare					
	1995	2000	2005	2010	2015	2016
<b>Georgia</b>	<b>1 002</b>	<b>258</b>	<b>10</b>	<b>111</b>	<b>21</b>	<b>50</b>
Tbilisi	35	18	1	-	-	-
Adjara AR	70	11	1	-	7	2
Guria	25	5	-	-	-	19
Imereti	130	59	-	-	-	0.0
Kakheti	220	27	0.0	109	7	25
Mtskheta-Mtianeti	90	18	4	0.0	-	2
Racha-Lechkhumi and Kvemo Svaneti	33	17	-	-	-	-
Samegrelo-Zemo Svaneti	211	43	-	-	-	-
Samtskhe-Javakheti	34	12	-	2	7	0.0
Kvemo Kartli	110	25	-	-	0.0	1
Shida Kartli	44	23	4	-	0.0	1

Source: Ministry of Environment and Natural Resources Protection of Georgia.

National Forestry Agency.

Forestry Agency of Adjara.

## 2.9 Facilitating natural recovery of forest

	Hectare					
	1995	2000	2005	2010	2015	2016
<b>Georgia</b>	<b>12 910</b>	<b>900</b>	<b>64</b>	<b>54</b>	<b>121</b>	<b>128</b>
Tbilisi	90	-	-	-	-	-
Adjara AR	3 000	-	-	-	118	100
Guria	1 100	158	-	-	-	-
Imereti	1 050	22	-	-	-	-
Kakheti	870	20	-	54	-	-
Mtskheta-Mtianeti	610	50	-	-	-	-
Racha-Lechkhumi and Kvemo Svaneti	2 500	230	-	-	-	-
Samegrelo-Zemo Svaneti	1 910	130	4	-	-	-
Samtskhe-Javakheti	680	130	-	-	3	28
Kvemo Kartli	290	50	-	-	-	-
Shida Kartli	810	110	60	-	-	-

Source: Ministry of Environment and Natural Resources Protection of Georgia.

National Forestry Agency.

Forestry Agency of Adjara.

## 2.10 Volume of felled timber

	Cubic metre					
	1995	2000	2005	2010	2015	2016
<b>Georgia</b>	<b>289 712</b>	<b>442 140</b>	<b>810 615</b>	<b>876 749</b>	<b>712 336</b>	<b>628 035</b>
<b>Except for protected areas</b>						
Tbilisi	19 192	4 741	6 278	...	...	...
Adjara A/R	24 464	44 648	73 007	77 868	75 510	65 422
Samegrelo-Zemo Svaneti	4 952	24 463	56 384	16 193	12 269	8 526
Guria	19 098	45 270	103 718	97 440	80 775	57 443
Imereti	44 890	61 893	119 479	181 706	140 086	121 773
Racha-Lechkhumi and Kvemo Svaneti	20 341	36 029	68 938	86 944	74 956	63 545
Shida Kartli	16 509	52 706	52 713	37 148	60 919	59 145
Mtskheta-Mtianeti	22 175	55 923	110 376	91 524	29 019	39 538
Kakheti	71 916	72 483	123 253	94 374	89 170	79 784
Kvemo Kartli	32 552	20 757	44 100	89 704	52 496	44 222
Samtskhe-Javakheti	13 623	23 227	52 369	103 848	76 661	71 284
<b>Protected areas</b>	...	...	...	...	<b>20 475</b>	<b>17 353</b>

Source: Ministry of Environment and Natural Resources Protection of Georgia.

National Forestry Agency.

Forestry Agency of Adjara.

Agency of Protected Areas.

## 2.11 Illegal logging

	Cubic metre			
	2013	2014	2015	2016
<b>Georgia</b>	<b>6 039</b>	<b>45 915</b>	<b>44 612</b>	<b>28 586</b>
<b>Except for protected areas</b>				
Tbilisi	...	...	...	...
Adjara A/R	1 671	1 895	1 880	1 044
Samegrelo-Zemo Svaneti	225	474	729	647
Guria	1 182	9 105	3 087	3 958
Imereti	432	565	18 686	9 568
Racha-Lechkhumi and Kvemo Svaneti	102	20 498	1 576	993
Shida Kartli	268	802	1 993	320
Mtskheta-Mtianeti	236	2 291	1 766	2 119
Kakheti	752	1 583	10 648	7 170
Kvemo Kartli	229	6 636	1 783	1 738
Samtskhe-Javakheti	188	1 596	1 581	845
<b>Protected areas</b>	<b>756</b>	<b>472</b>	<b>883</b>	<b>185</b>

Source: Ministry of Environment and Natural Resources Protection of Georgia.

National Forestry Agency.

Forestry Agency of Adjara.

Agency of Protected Areas.

**2.12 Export of non-processed timber**

	2000	2005	2010	2015	2016
	Thousand USD				
<b>Total export</b>	<b>3 065.3</b>	<b>49.5</b>	<b>-</b>	<b>6.1</b>	<b>11.9</b>
USA	-	0.2	-	-	-
United Kingdom	1.2	-	-	-	-
Germany	26.8	-	-	0.2	-
Spain	77.8	-	-	-	-
Turkey	2 694.3	-	-	-	11.9
Iran	-	5.6	-	-	-
Israel	8.9	-	-	-	-
Italy	87.5	-	-	-	-
Latvia	1.6	-	-	-	-
Russia	9.6	-	-	-	-
Greece	60.3	-	-	-	-
Armenia	-	43.7	-	5.9	-
Ukraine	1.7	-	-	-	-
Switzerland	1.0	-	-	-	-
China	94.6	-	-	-	-
	Cubic metre				
<b>Total export</b>	<b>39 033</b>	<b>559</b>	<b>-</b>	<b>33</b>	<b>15</b>
USA	-	1	-	-	-
United Kingdom	17	-	-	-	-
Germany	251	-	-	0.0	-
Spain	588	-	-	-	-
Turkey	35 693	-	-	-	15
Iran	-	71	-	-	-
Israel	64	-	-	-	-
Italy	755	-	-	-	-
Latvia	24	-	-	-	-
Russia	78	-	-	-	-
Greece	721	-	-	-	-
Armenia	-	487	-	33	-
Ukraine	42	-	-	-	-
Switzerland	13	-	-	-	-
China	787	-	-	-	-

Source: National Statistics Office of Georgia.

### 2.13 Import of non-processed timber

	2000	2005	2010	2015	2016
Thousand USD					
<b>Total import</b>	<b>7.7</b>	<b>632.3</b>	<b>2 222.8</b>	<b>4 058.4</b>	<b>3 043.7</b>
United Kingdom	-	-	-	-	20.2
Germany	-	-	-	1.8	-
Turkey	-	-	-	-	221.9
Russia	7.7	43.9	-	12.8	-
Slovakia	-	-	-	-	15.8
Ukraine	-	588.4	1 655.8	4 043.8	2 785.8
Czech Republic	-	-	567.0	-	-
Cubic metre					
<b>Total import</b>	<b>212</b>	<b>8 430</b>	<b>18 803</b>	<b>27 052</b>	<b>23 114</b>
United Kingdom	-	-	-	-	169
Germany	-	-	-	3	-
Turkey	-	-	-	-	1 130
Russia	212	429	-	32	-
Slovakia	-	-	-	-	32
Ukraine	-	8 001	17 915	27 017	21 783
Czech Republic	-	-	888	-	-

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.

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 fundamentals 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

<b><i>Biocenosis</i></b>	Unity of plants and animals which exist in more or less similar conditions (animals and plants of particular field or coast).
<b><i>Managed reserve</i></b>	Protected area established for the purpose of protecting natural conditions for preservation of wild species, biocenosis and non organic 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.
<b><i>National park</i></b>	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.
<b><i>Natural monument</i></b>	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.
<b><i>Protected area</i></b>	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. Categories of protected areas are the following: restricted area, natural monument, national park, public reserve, and protected landscape.
<b><i>Protected landscape</i></b>	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.
<b><i>Strict nature reserve</i></b>	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.
<b><i>Travertine</i></b>	Dense, banded rock composed of calcium carbonate, formed by the evaporation of river and spring waters.



### 3.1 Structure of protected areas of Georgia, 2016

Name
<b>1 Administration of Borjomi-Kharagauli National Park</b> Protected areas under supervision: Borjomi Strict Nature Reserve Borjomi-Kharagauli National Park Tetrobi Managed Reserve Nedzvi Managed Reserve Ktsia-Tabatskuri Managed Reserve
<b>2 Administration of Tusheti Protected Areas</b> Protected areas under supervision: Tusheti Strict Nature Reserve Tusheti National Park <b>Under the supervision of Local Municipality:</b> Tusheti Protected Landscape
<b>3 Administration of Vashlovani Protected Areas</b> Protected areas under supervision: Alazani Floodplains National Monument Eagle Gorge Natural Monument Vashlovani National Park Vashlovani Strict Nature Reserve Takhti-Tepa Natural Monument
<b>4 Administration of Kintrishi Protected Areas</b> Protected areas under supervision: Kintrishi Protected Landscape Kintrishi Strict Nature Reserve
<b>5 Administration of Lagodekhi Protected Areas</b> Protected areas under supervision: Lagodekhi Managed Reserve Lagodekhi Strict Nature Reserve
<b>6 Administration of Mariamjvari Strict Nature Reserve</b> Protected areas under supervision: Iori Managed Reserve Mariamjvari Strict Nature Reserve Korughi Managed Reserve
<b>7 Administration of Kazbegi National Park</b> Protected areas under supervision: Abano Mineral Water Lake Natural Monument Truso Travertine National Monument Sakhznari Natural Monument Kazbegi National Park Keterisi Mineral Vaucluse Natural Monument Jvari Overpass Travertine Natural Monument

continued

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**8 Administration of Kobuleti Protected Areas**

Protected areas under supervision:  
Kobuleti Managed Reserve  
Kobuleti Strict Nature Reserve

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**9 Administration of Imereti Caves Protected Areas**

Protected areas under supervision:  
Sataplia Strict Nature Reserve  
Sataplia Managed Reserve  
Prometheus Natural Monument  
White Cave Natural Monument  
Khomuli Cave Natural Monument  
Tsutskhvati Cave Natural Monument  
Navenakhevi Cave Natural Monument  
Nagarevi Cave Natural Monument  
Jason's Cave Natural Monument  
Sakazhia Cave Natural Monument  
Tskaltsitela Gorge Natural Monument  
Gabzaruli Lake Natural Monument  
Satsurblia Cave Natural Monument  
Solkota Cave Natural Monument  
Didghele Cave Natural Monument  
Melouri Cave Natural Monument  
Bgheri Cave Natural Monument  
Ghliana Cave Natural Monument

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**10 Administration of Martvili and Okatse Natural Monument**

Protected areas under supervision:  
Abasha Waterfall Natural Monument  
Baldi Canion Natural Monument  
Gochkadila Canion Natural Monument  
Martvili Canyon Natural Monument  
Motena Cave Natural Monument  
Nazodelao Cave Natural Monument  
Okatse Canyon Natural Monument  
Okatse Waterfall Natural Monument  
Oniore Waterfall and the Tobas's First Cave Natural Monument  
Ochxamuri Waterfall Natural Monument  
Toba Waterfall and Arsen Okrojanashvili Natural Monument  
Jortsku Cave Natural Monument

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**11 Administration of Mtirala National Park**

**12 Administration of Algeti National Park**

Protected areas under supervision:  
Birtvisi Natural Monument  
Dashbashi Canyon Natural Monument  
Samshilde Canyon Natural Monument

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continued

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**13 Administration of Batsara-Babaneuri Protected Areas**

Protected areas under supervision:

Babaneuri Strict Nature Reserve

Batsara Strict Nature Reserve

Ilto Managed Reserve

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**14 Administration of Tbilisi National Park**

Protected areas under supervision:

Gardabani Managed Reserve

Tbilisi National Park

---

**15 Administration of Kolkheti National Park**

Protected areas under supervision:

Katsoburi Managed Reserve

Kolkheti National Park

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**16 Administration of Ajameti Managed Reserve**


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**17 Administration of Chachuna Managed Reserve**


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**18 Administration of Javakheti Protected Areas**

Protected areas under supervision:

Bughdasheni Lake Managed Reserves

Kartsakhi Lake Managed Reserves

Madatapa Managed Reserves

Sulda Managed Reserves

Khanchali Lake Managed Reserves

Javakheti National Park

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**19 Administrations of Machakhela National Park**


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**20 Administration of Pshav-Khevsureti National Park**

Protected areas under supervision:

Asa Managed Reserve

Roshka Natural Monument

Pshav-Khevsureti National Park

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**21 Administration of Liakhvi Strict Nature Reserve**


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**22 Administration of Pskhu-Gumista Strict Nature Reserve**

Protected areas under supervision:

Gumista Strict Nature Reserve

Skurchi Strict Nature Reserve

Pskhu Strict Nature Reserve

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**23 Administration of Ritsa Strict Nature Reserve**


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**24 Administration of Bichvinta-Miusera Strict Nature Reserve**

Protected areas under supervision:

Bichvinta Strict Nature Reserve

Lidzava Strict Nature Reserve

Miusera Strict Nature Reserve

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 Source: Ministry of Environment and Natural Resources Protection of Georgia.

Agency of Protected Areas.

### 3.2 Protected areas of Georgia by categories, 2016

Name	Total area, hectare
<b>Protected areas, total*</b>	<b>597 547</b>
<b>Area of strict nature reserves</b>	<b>139 049</b>
1 Babaneuri	862
2 Batsara	2 986
3 Bichvinta-Miusera	3 645
4 Borjomi	13 169
5 Vashlovani	10 143
6 Tusheti	12 627
7 Kintrishi	10 703
8 Lagodekhi	19 749
9 Liakhvi	6 388
10 Mariamjvari	1 023
11 Ritsa	16 289
12 Sataplia	330
13 Pskhu-Gumista	40 819
14 Kobuleti	331
<b>Area of national parks</b>	<b>349 327</b>
1 Algeti	6 822
2 Borjomi-Kharagauli	60 576
3 Vashlovani	24 610
4 Tbilisi	21 036
5 Tusheti	69 515
6 Kolkheti	44 309
7 Machakhela	8 733
8 Mtirala	15 699
9 Pshav-Khevsureti	75 843
10 Kazbegi	8 687
11 Javakheti	13 498
<b>Area of managed reserves</b>	<b>71 530</b>
1 Asa	3 943
2 Ajameti	4 991
3 Bugdasheni	119
4 Gardabani	3 734
5 Tetrobi	3 100
6 Ilto	6 971
7 Iori	2 127
8 Kartsakhi	158
9 Kacoburi	271
10 Lagodekhi	4 702

		continued
11	Madatapa	1 398
12	Nedzvi	9 213
13	Satapia	34
14	Sulda	309
15	Kobuleti	466
16	Ktsia-Tabatskuri	22 000
17	Korughi	2 068
18	Chachuna	5 200
19	Khanchali	727
<b>Area of natural monuments**</b>		<b>2 932</b>
1	Abano Mineral Lake	0.0
2	Alazani Floodplain Forests	204
3	Artsivi Gorge	100
4	Balda Canyon	6
5	Bodorna Rock Columns	18
6	Birtvisi	561
7	Bgheri Cave	...
8	Gabzaruli Lake	...
9	Goderdzi Pertified Forest	36
10	Dashbashi Canyon	669
11	Didghele Cave	...
12	Tetri Cave	2
13	Truso Travertines	4
14	Iazoni Cave	...
15	Martvili (Gochkadila) Canyon	13
16	The River Abasha Waterfall	99
17	Melouri Cave	...
18	Motena Cave	2
19	Mukhura Waterfall	14
20	Nagarevi Cave	...
21	Navenakhevi Cave	...
22	Nazodealo Cave	12
23	Okatse Canion	71
24	Okatse Waterfall	...
25	Oniore Waterfall and the First Toba Cave	33
26	Ochkhomuri Waterfall	9
27	Prometheus Cave	47
28	Roshka	122
29	Sakazhia Cave	...
30	Samshvide Canyon	475
31	Satsurbliia Cave	0.0

		continued
32	Sakhizari Cliff	336
33	Solkota Cave	0.0
34	Takhti-Tepa	10
35	Toba Waterfall and Arsen Okrojanashvili Cave	73
36	Keterisi Mineral Vaucluse	1
37	Ghliana Cave	...
38	Tsutskhvati Cave	...
39	Tskaltsitela Gorge	12
40	Khomuli Cave	...
41	Jvari Overpass Travertine	3
42	Jortsku Cave	2
<b>Area of protected landscapes</b>		<b>34 708</b>
1	Tusheti	31 518
2	Kintrishi	3 190

Source: Ministry of Environment and Natural Resources Protection of Georgia.

Agency of Protected Areas

Note: \* Including occupied territories of Autonomous Republic of Abkhazia and Tskhinvali region.

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

### 3.3 Area and categories of protected areas of Georgia, 2016

	Number, unit	Area, hectare
Strict nature reserves	14	139 049
National parks	11	349 327
Managed nature reserves	19	71 530
Natural monuments	42	2 932
Protected landscapes	2	34 708

Source: Ministry of Environment and Natural Resources Protection of Georgia.

Agency of Protected Areas

Note: Including occupied territories of Autonomous Republic of Abkhazia and Tskhinvali region.

**3.4 Number of main animal species preserved in the protected areas**

Name	1995	2000	2005	2010	2015	2016	unit
Chamois	672	807	594	552	672	617	
Hyena	-	2	-	1	6	-	
Brown bear	213	265	325	543	863	501	
Deer	776	194	299	554	877	955	
Wildcat	98	83	2 507	511	88	143	
Marten	475	476	1 816	1 598	827	875	
Hare	1 046	948	551	3 599	559	589	
Badger	290	298	7 018	828	274	411	
Grey wolf	210	310	224	626	702	559	
Fox	340	694	275	667	513	933	
Wild goat	130	150	170	150	419	418	
Nutria	30	40	-	1 293	885	410	
Jackal	282	187	4 173	9 151	7 309	5 745	
Lynx	39	37	63	85	111	95	
Boar	126	230	320	892	966	1 127	
Roe	759	735	1 372	2 613	2 263	3 507	
Squirrel	780	130	50	1 667	333	843	
Otter	10	20	168	411	307	286	
Auroch	750	641	695	1 455	1 689	1 068	

Source: Ministry of Environment and Natural Resources Protection of Georgia.  
Agency of Protected Areas.

**3.5 Number of main bird species preserved in the protected areas**

Name	1995	2000	2005	2010	2015	Unit
Gorge eagle	...	2	10	46	54	51
Field eagle	...	10	10	...	...	158
Mountain eagle	79	55	38	51	36	44
Owl	176	419	531	30	198	212
Nightingale	60	90	40	...	...	...
Grey partridge	...	...	100	...	...	...
Partridge	890	365	2 120	4 670	2 235	...
Woodpecker	2 894	449	504	2 311	871	15 788
Sparrowhawk	46	97	75	403	96	2 741
Gyps	15	28	80	116	114	167
Caucasian grouse	412	780	982	845	966	966
Cinereous vulture	...	12	42	184	159	116
Eurasian woodcock	252	692	528	950	3 300	7 727
Black ring dove	670	...	375	362	...	1 190
Hawk	60	75	35	608	380	301
Black stork	...	...	10	20	1 084	215
Crow	90	310	150	35	2 000	2 674
Blackbird	2 970	1 930	1 842	3 652	5 000	11 151
Falcon	12	...	16	18	62	83
Caucasian snowcock	641	702	766	645	886	505
Mistle thrush	2 340	1 380	1 100	210	1 000	68
Eurasian jay	1 440	1 100	779	2 158	1 900	669
Black kite	...	...	50	17	39	33
Pheasant	20	45	166	647	700	...

Source: Ministry of Environment and Natural Resources Protection of Georgia.

Agency of Protected Areas.



**3.6 Expenses on the maintenance of protected areas and number of employees, 2016**

Administration	Person					Thousand GEL		
	Total number of employees	Head of administration	Specialist of natural resources	Security staff	Other staff	Total expenses on maintenance of protected areas	From state budget	From other sources
<b>Total in Georgia</b>	<b>482</b>	<b>20</b>	<b>25</b>	<b>314</b>	<b>123</b>	<b>6 898.7</b>	<b>4 033.1</b>	<b>2 865.6</b>
Agency Protected Areas	36	0	3	0	33	1 393.9	820.0	573.9
Borjomi-Kharagauli National Park	76	1	2	61	12	1 036.6	552.1	484.5
Tusheti Protected Areas	32	1	1	25	5	423.5	222.3	201.2
Vashlovani Protected Areas	34	1	1	27	5	563.7	263.0	300.7
Kintrishi Protected Areas	11	1	1	7	2	125.5	76.6	48.9
Lagodekhi Protected Areas	23	1	0	19	3	322.5	171.6	150.9
Mariamjvari Strict Nature Reserve	10	1	1	8	0	83.8	71.9	11.9
Batsara- Babaneuri Protected Areas	14	1	1	12	0	126.7	104.2	22.5
Kobuleti Protected Areas	9	1	1	3	4	74.4	59.1	15.3
Imereti Caves Protected Areas	42	1	2	11	28	540.8	250.5	290.2
Mtirala National Park	19	1	1	13	4	314.1	154.3	159.8
Algeti National Park	16	1	1	11	3	163.3	97.3	66.0
Kazbegi National Park	12	1	1	7	3	133.5	83.6	49.8
Tbilisi National Park	39	1	2	31	5	302.5	256.3	46.3
Kolkheti National Park	35	1	2	26	6	309.9	257.9	52.0
Ajmeti Managed Nature Reserve	17	1	1	15	0	136.7	116.5	20.1
Chachuna Managed Nature Reserve	6	1	1	4	0	62.1	54.0	8.1
Javakheti Protected areas	11	1	1	6	3	263.3	109.3	154.0
Machakhela National Park	18	1	1	13	3	144.8	125.6	19.2
Martvili and Okatse Natural Monument	16	1	0	11	4	293.9	132.8	161.1
Pshav-Khevsureti National Park	6	1	1	4	0	83.2	54.2	29.0

Source: Ministry of Environment and Natural Resources Protection of Georgia.

Agency of Protected Areas.

## 4. WATER RESOURCES

Area of the earth surface is 510.0 million square kilometres, its 71%, that is 362.1 million square kilometres, is occupied by the ocean that creates illusion of abundance of water resources. In fact 97.5% of the total hydrosphere reserve (1 353.3 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 cubic metres is being used, that clearly demonstrates problem of fresh water deficit.

According to internal waters (rivers, lakes, ground waters, glaciers, and wetlands) Georgia was one of the leading countries in the Soviet Union. However, rivers are unequally distributed between eastern and western Georgia. In western Georgia run-off of rivers (together with transit run-off) is 49.8 km<sup>3</sup>, and in eastern Georgia – 16.5 km<sup>3</sup>.

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 arranged 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. Quality of river and reservoir water of Georgia is alarming. Even in 1986 pollution level per unit of river run-off was 17 times more than an average world index.

Sharp decrease in industrial production in recent years implied only one positive result: amount of hazardous substances emitted into the atmosphere and pollution level in wastewaters decreased.

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

<b><i>Losses of water during transport</i></b>	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.
<b><i>Mechanical treatment of wastewater</i></b>	Process of wastewater treatment which is used for filtering wastewater from solid particles, stones, sand, waste, etc.
<b><i>Water abstraction from natural water bodies</i></b>	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.
<b><i>Polluted wastewater</i></b>	Industrial and household wastewater (including mine, fossil and draining waters) which contains much more polluting substances than admissible amount.
<b><i>Water use</i></b>	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.
<b><i>Water use for drinking and household needs</i></b>	Volume of water used by population and employees of enterprises and organizations (excluding agricultural ones) for economic, household and communal needs.
<b><i>Water use for industrial needs</i></b>	Total volume of water used for industrial needs (excluding agriculture) and for filling the cycling water supply systems.
<b><i>Water supply system</i></b>	System of receiving, transportation and distribution of water (pipelines, reservoirs, open and closed channels, etc) that is used for supplying water to customers.

#### 4.1 Big and medium rivers of Georgia

Name of the river	Length of the river on the territory of Georgia, kilometre	Area of river basin, square kilometre	Corresponding sea basin
Alazani	362	11 800	The Caspian Sea
Rioni	327	13 400	The Black Sea
Kura	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
Bzipi	110	2 030	The Black Sea
Kodori	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
Abasha	66	1 390	The Black Sea
Mashavera	66	350	The Caspian 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 and Natural Resources Protection of Georgia.

## 4.2 Main lakes and reservoirs of Georgia

Name	Surface area, square kilometre	Volume, million cubic metre	Average depth, metre	Maximum depth, metre
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 and Natural Resources Protection of Georgia.

### 4.3 Main indicators for water supply industry and wastewater collection

	2015	2016
	Percentage	
Population connected to water supply industry	57.7	61.0
Population connected to a wastewater collecting system	44.3	46.5
Population connected to wastewater treatment facilities	32.2	34.0
Population connected to wastewater mechanical treatment facilities	28.6	29.4
	Million cubic metre	
Gross volume of water supplied by water supply industry	683.2	676.0
Losses of water during transport	403.9	428.9
Net volume of water supplied by water supply industry	279.2	247.1
Water supplied to households by water supply industry	243.3	207.9

Source: National Statistics Office of Georgia.

### 4.4 Main indicators for protection and use of water resources

	Million cubic metre				
	2012	2013	2014	2015	2016
<b>Water abstraction from natural water bodies, total</b>	<b>2 412.0</b>	<b>2 117.0</b>	<b>2 070.0</b>	<b>1 863.0</b>	<b>1 826.0</b>
Water abstraction from groundwater bodies	368.0	403.2	399.0	498.5	479.9
<b>Water use, total</b>	<b>1 772.0</b>	<b>1 617.0</b>	<b>1 583.0</b>	<b>1 393.0</b>	<b>1 215.0</b>
Household needs	330.2	448.2	434.4	381.5	340.8
Industrial needs	362.5	293.5	315.0	354.8	262.4
Other needs	1 079.3	875.3	833.6	656.7	611.8
<b>Wastewater discharge into surface water bodies, total</b>	<b>597.9</b>	<b>593.6</b>	<b>661.2</b>	<b>634.0</b>	<b>358.8</b>
Polluted wastewater	475.3	438.2	477.7	457.2	159.0
Losses of water during transport	640.0	500.0	487.0	470.0	611.0
Cycling and secondary water supply	224.0	309.0	316.0	226.8	190.3

Source: Ministry of Environment and Natural Resources Protection of Georgia.

Note: Water for hydroelectricity generation purposes is excluded.

## 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 (78.084%) and oxygen (20.976%). Carbon dioxide has a very small share in the atmosphere (0.0314%), 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 well known that a person daily consumes about 1 kg food, 1.5 litre water and 12 kg air in relaxed condition. 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. In the near future the substance substituting mentioned types of fuel will be hydrogen, which is cheaper and more flexible than electricity. In combustion process it mixes with oxygen and without smoke develops steam in insignificant amount.

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 tonnes 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.).

### 5.1 Number of stationary sources emitting hazardous substances

	1995	2000	2005	2010	2015	2016	Unit
Number of stationary sources	132	117	153	1 099	2 695	2 891	

Source: Ministry of Environment and Natural Resources Protection of Georgia.

### 5.2 Main indicators of generation of hazardous substances in stationary sources and protection of atmospheric air

	1995	2000	2005	2010	2015	2016
<b>Hazardous substances generated in stationary sources, total</b>	<b>30.4</b>	<b>28.7</b>	<b>57.3</b>	<b>661.0</b>	<b>802.2</b>	<b>772.5</b>
Captured hazardous substances	15.0	10.0	33.2	630.7	757.3	728.0
Share of captured hazardous substances in total generated hazardous substances (%)	49.3	35.0	57.9	95.4	94.4	94.2

Source: Ministry of Environment and Natural Resources Protection of Georgia.

## 5.3 Captured and emitted hazardous substances generated in stationary sources

	Generated	Captured	Emitted	Thousand ton Share of captured hazardous substances, %
2000				
<b>Hazardous substances, total</b>	<b>28.7</b>	<b>10.0</b>	<b>18.7</b>	<b>35.0</b>
Solid	9.2	5.9	3.3	64.6
Gaseous and liquid	19.5	4.1	15.4	21.1
Sulphur dioxide	0.4	-	0.4	-
Carbon monoxide	3.7	1.9	1.8	51.0
Nitrogen oxides	4.1	1.0	3.1	23.5
Hydrocarbons	8.1	-	8.1	-
Other	3.2	1.2	2.0	37.4
2005				
<b>Hazardous substances, total</b>	<b>57.3</b>	<b>33.2</b>	<b>24.1</b>	<b>57.9</b>
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				
<b>Hazardous substances, total</b>	<b>661.0</b>	<b>630.7</b>	<b>30.1</b>	<b>95.4</b>
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

	Generated	Captured	Emitted	continued Share of captured hazardous substances, %
2015				
<b>Hazardous substances, total</b>	<b>802.2</b>	<b>757.3</b>	<b>44.9</b>	<b>94.4</b>
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				
<b>Hazardous substances, total</b>	<b>772.5</b>	<b>728.0</b>	<b>44.5</b>	<b>94.2</b>
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	13.0
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

Source: Ministry of Environment and Natural Resources Protection of Georgia.

#### 5.4 Capture and emission of hazardous substances generated in stationary sources by regions

	Generated	Captured	Thousand ton Emitted
2000			
<b>Georgia</b>	<b>28.7</b>	<b>10.0</b>	<b>18.7</b>
Tbilisi	0.8	0.2	0.6
Adjara AR	9.8	0.0	9.8
Guria	0.0	0.0	0.0
Imereti	3.6	3.1	0.5
Kakheti	0.0	0.0	0.0
Mtskheta-Mtianeti	0.2	-	0.2
Racha-Lechkhumi and Kvemo Svaneti	-	-	-
Samegrelo-Zemo Svaneti	0.5	0.0	0.4
Samtskhe-Javakheti	0.0	-	0.0
Kvemo Kartli	13.5	6.7	6.8
Shida Kartli	0.2	0.1	0.1
2005			
<b>Georgia</b>	<b>57.3</b>	<b>33.2</b>	<b>24.1</b>
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			
<b>Georgia</b>	<b>661.0</b>	<b>630.7</b>	<b>30.1</b>
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

	Generated	Captured	Emitted
	continued		
	2015		
<b>Georgia</b>	<b>802.2</b>	<b>757.3</b>	<b>44.9</b>
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
	2016		
<b>Georgia</b>	<b>772.5</b>	<b>728.0</b>	<b>44.5</b>
Tbilisi	59.5	57.7	1.8
Adjara AR	6.4	5.2	1.2
Guria	3.3	2.3	1.0
Imereti	72.0	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

Source: Ministry of Environment and Natural Resources Protection of Georgia.

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

City	Thousand ton				
	Hazardous substances			Share of city, %	
	Generated	Captured	Emitted	In pollution of atmospheric air of region	In pollution of atmospheric air of region
<b>2015</b>					
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
<b>2016</b>					
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

Source: Ministry of Environment and Natural Resources Protection of Georgia.

**5.6 Emission of hazardous substances from road transport by type of substances**

Hazardous substances	Thousand ton					
	2010	2011	2012	2013	2014	2015
Carbon oxides (CO)	118.0	108.0	100.3	95.1	91.1	93.8
Nitrogen oxides (NO <sub>2</sub> )	20.1	21.2	22.2	22.9	23.5	25.8
Hydrocarbons (NmVOC)	15.5	14.8	14.3	13.9	13.6	14.2
Particulate matters (PM <sub>10</sub> )	1.1	1.1	1.2	1.2	1.2	1.4
Particulate matters (PM <sub>2.5</sub> )	0.9	1.0	1.0	1.1	1.1	1.2
Soot (EC)	0.4	0.4	0.4	0.5	0.5	0.5
Ammonia (NH <sub>3</sub> )	0.2	0.2	0.3	0.3	0.3	0.4
Sulphur dioxide (SO <sub>2</sub> )	0.4	0.5	0.4	0.4	0.2	0.3
Other hazardous substances	0.0	0.0	0.0	0.0	0.0	0.0

Source: Ministry of Environment and Natural Resources Protection of Georgia.



## **6. NATURAL HAZARDS AND VIOLATIONS OF LAW**

### Definition of terms used in tables

<b><i>Avalanche</i></b>	A rapid flow of snow or land down a sloping surface.
<b><i>Flash Flood</i></b>	A sudden raise f water level caused by heavy rains and intensive snow melting.
<b><i>Flood</i></b>	An overflow of river water that submerges land (during heavy rains or melting of snow).
<b><i>Hail</i></b>	A form of solid precipitation that consists of ball or irregular lumps of ice.
<b><i>Hurricane</i></b>	Very strong wind, velocity of which exceeds 20 mpc and which causes strong storm on the sea and damage of buildings on the ground.
<b><i>Landslide</i></b>	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.
<b><i>Mudflow</i></b>	A downhill movement of soft wet and debris, made fluid by rain or melted snow and often building up a great speed.
<b><i>Squall</i></b>	Short hurricane.

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

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	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

Source: Ministry of Environment and Natural Resources Protection of Georgia.

National Environmental Agency.

**6.2 Number of occurred hydrometeorological hazards**

Hydrometeorological hazard													Unit
	January	February	March	April	May	June	July	August	September	October	November	December	Total
<b>2012</b>													
Flood and flash flood	-	-	-	-	5	3	3	4	-	-	-	-	<b>15</b>
Hurricane and squall	-	-	-	-	-	1	1	1	-	2	-	-	<b>5</b>
Hail	-	-	-	-	7	2	2	3	-	-	-	-	<b>15</b>
Heavy snow	1	-	-	-	-	-	-	-	-	-	-	-	<b>1</b>
Avalanche	5	4	5	-	-	-	-	-	-	-	-	1	<b>15</b>
<b>2013</b>													
Flood and flash flood	-	-	-	-	1	2	1	2	1	-	-	1	<b>8</b>
Hurricane and squall	-	-	3	1	1	3	2	1	2	1	3	3	<b>20</b>
Hail	-	-	2	3	6	5	3	4	-	-	-	-	<b>23</b>
Heavy snow	-	-	-	-	-	-	-	-	-	-	-	-	-
Avalanche	1	2	2	1	-	-	-	-	-	-	-	2	<b>8</b>
<b>2014</b>													
Flood and flash flood	-	-	-	2	1	2	3	4	7	1	1	-	<b>21</b>
Hurricane and squall	-	3	2	1	3	8	2	2	6	5	2	-	<b>34</b>
Hail	-	-	-	3	8	10	1	3	3	-	-	-	<b>28</b>
Heavy snow	-	-	-	-	-	-	-	-	-	-	-	-	-
Avalanche	3	-	1	-	-	-	-	-	-	-	-	-	<b>4</b>
<b>2015</b>													
Flood and flash flood	-	-	-	1	2	4	1	-	-	1	1	-	<b>10</b>
Hurricane and squall	2	1	-	-	-	-	-	-	-	-	4	2	<b>9</b>
Hail	-	-	-	2	6	9	3	1	-	1	-	-	<b>22</b>
Heavy snow	2	-	-	-	-	-	-	-	-	-	-	-	<b>2</b>
Avalanche	3	-	-	-	-	-	-	-	-	-	-	-	<b>3</b>
<b>2016</b>													
Flood and flash flood	1	-	-	1	-	3	7	1	2	-	-	1	<b>16</b>
Hurricane and squall	2	1	2	4	-	1	-	4	2	-	1	2	<b>19</b>
Hail	-	-	-	-	10	6	3	4	-	1	-	-	<b>24</b>
Heavy snow	4	-	1	-	-	-	-	-	-	1	-	2	<b>8</b>
Avalanche	-	-	-	-	1	-	-	-	-	-	1	3	<b>5</b>

Source: Ministry of Environment and Natural Resources Protection of Georgia.

National Environmental Agency.

**6.3 Revealed violations of law related to environmental protection by regions and violation types, 2016**

														Unit
	Illegal logging	Violation of timber transportation rules	Violation of fishing rules	Violation of hunting rules	Violation of technical regulation of sawmills	Illegal mining	Violation of mining licence terms	Violation of atmospheric air legislation	Violation of water legislation	Violation of land legislation	Pollution of environment by waste disposal	Violation of permission terms/activity without permission	Other violations	Total number of revealed violations of law
<b>Georgia</b>	<b>1 260</b>	<b>1 222</b>	<b>513</b>	<b>857</b>	<b>748</b>	<b>888</b>	<b>815</b>	<b>1 072</b>	<b>160</b>	<b>264</b>	<b>1 775</b>	<b>84</b>	<b>465</b>	<b>10 123</b>
Tbilisi	0	6	41	19	4	9	19	173	4	5	632	10	13	935
Adjara AR	195	46	11	57	46	322	28	45	18	2	320	6	9	1 105
Guria	24	37	17	89	13	60	80	48	14	11	32	2	35	462
Imereti	92	129	56	263	87	281	218	281	49	58	189	14	63	1 780
Kakheti	419	272	77	127	77	40	81	51	9	21	97	2	44	1 317
Mtskheta-Mtianeti	13	42	30	15	5	28	65	44	9	5	57	2	42	357
Racha-Lechkhumi and Kvemo Svaneti	26	25	2	2	28	9	23	51	1	3	8	4	71	253
Samegrelo-Zemo Svaneti	61	125	60	81	141	50	73	95	25	36	155	5	93	1 000
Samtskhe-Javakheti	351	277	24	33	270	27	51	120	10	109	152	4	45	1 473
Kvemo Kartli	48	141	106	98	1	39	85	50	15	8	79	28	6	704
Shida Kartli	31	122	89	73	76	23	92	114	6	6	54	7	44	737

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