

Reserved Areas Importance for Mitigation of Climate Change

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Abstract

Scientific-technical progress that we observe for last several decades in the world along with the sufficient benefits to our society brings many detrimental effects to environment, plant biodiversity and climate change. Increased levels of exhausted transport emissions into atmosphere poison ambient air in big cities and settlements causing allergies, respiratory and cardiovascular diseases and lung damage. Great threats to climate change are: deforestation, forest degradation and overexploitation of bio-resources of the planet in many countries of the world like Brazil, Russia, the Republic of Indonesia. Forest fires, taking place every year in North America, Australia, Russia, are also big contributors to climate change. In this situation forests and reserved areas can play very important role in mitigation of threats by absorbing carbon dioxide. As more forests and reserved areas we have on the planet, as more carbon dioxide be absorbed and more oxygen omitted into atmosphere and vice versa. This goal can be achieved by enlargement of existed and creation of new reserved areas, preservation of all forests with joint efforts of governments, scientists and policy-makers from all countries of the world.

Key Words: Reserved Area, Biodiversity, Climate Change, Mitigation, Deforestation, Degradation

Introduction

Reserved areas are the essential natural part of global response to climate change. They play important role in climate change mitigation and adaptation by reducing greenhouse gas emissions and helping society to cope with impacts of climate change by maintaining services for people. Reserved areas can prevent the loss of carbon in vegetations. The percentage of carbon stock in protected areas according to geographical regions of the world is presented in table 1.1. From the table we see that the most amount of carbon stock are in Greenland, Central America and Caribbean, South

America, East Asia, Southeast Asia, Africa, Europe, Australia and New Zealand.

Ecosystem degradation is one of the main causes of Greenhouse Gas emissions, that is about 20% of the total Greenhouse Gas emissions altogether [1, 2]. Degradation of ecosystem services in the world contributed to increase of such national disasters as: floods, storms, tidal surges, droughts and wild fires [3]. For last several decades economic losses from climate-induced disasters increased 10 times and is expected to keep this trend in future [4,5].

Table 1: Global Carbon Storage in Protected Areas Per Region

Region	Carbon stock (GT)		Percentage
	Total	In protected area	In protected area
North America	388	59	15.1
Greenland	5	2	51.2
Central America and Caribbean	16	4	25.2
South America	341	91	26.8
Europe	100	14	13.6
North Eurasia	404	36	8.8
Africa	356	49	13.7
Middle East	44	3	7.8
South Asia	54	4	7.2
East Asia	124	20	16.3
Southeast Asia	132	20	15.0
Australia and New Zealand	85	10	12.0
Pacific	3	0	4.3
Atlantic and peripheral islands	1	0	0.3

Note: Figures of carbon stock are rounded up but percentage figures are calculated from the Real figures

Source: Dudley N.S. et.al. [1]

Forest reserved areas help to conserve ecosystems that provide habitat, food, raw materials. They can be barriers against natural disasters, stable source of natural resources and many other ecosystem services [6-7]. Forest reserved areas help people as well as species of flora and fauna in adaptation to climate change. This protective status of reserved areas should remain free from destructive human-caused interventions [8-10].

Results and Analysis

In recent years the intensity and frequency of extreme adverse events driven by global warming arose. Frequency of droughts and strong winds in spring increased in semi-arid regions. Climate change problems in Georgia are of great concern in those areas that are most vulnerable to them: coastal, mountain and semi-arid areas. Coastal erosion and abrasion processes have intensified in the Black Sea zone. By altitudinal spectrum climate change is more affecting high mountain ecosystems. Glacial retreat that is already observed in the Alps and the Andes is also occurring in the Caucasus range at an alarming rate. The satellite images show that the average speed of glacial retreat on the Caucasian mountain range is 8m.per year and their total surface decreased by 6-9 %. At lower mountain altitudes changes are observed in loss of water regulation an changes in ecosystem composition and resilience. Scientific researches show that climate change will be more pronounced in high-elevation ranges in future as they are warming

faster than adjacent lowlands. Hydrological and ecological changes of this magnitude would result in a loss of unique biodiversity loss, as well as of many environmental goods and services, especially water supply, basin regulation and associated hydrological potential [11].

Georgia is noted for biodiversity and recognized as one of the 34 biodiversity, hotspots” by Conservation International as an area distinguished for richness of species and complex of landscapes, variation of climate and ecosystems [11]. The central and eastern parts of Caucasus mountains are especially rich by endemics. Some ecosystems of Georgia have global environmental value. There are 31 sites of special importance for bird species, 17 sites of special interest for biodiversity, which bare included in the Emerald Network. Since 2019 Georgia officially Adopted Emerald cites of their territories [12]. The wetland forests of central Kholkheti Lowland located by the Black Sea coastal line, as well as unique peat bogs and alder forests are included in the Ramsar List of Wetlands of international importance. [13].

From 4,130 plant species growing in Georgia about 3,000 grow on reserved territories, 300 among them are endemics of Caucasus and Georgia and 600 more of Georgia [14]. Some reserved areas are created for protection of unique habitats of such relict and endemic species as: Strawberry tree (*Arbutus andrachne*), Caucasus rhododendron (*Rhododendron caucasica*), Birch-trees of Litvinov, Medvedev and Radde (*Betula Litwinowi*, *Betula Medvedewi*, *Betula Raddeana*), Oak-trees (*Quercus imeretina*, *Quercus pontica*), European bladdernut (*Stafilea pinnata*), Colchis bladdernut (*Staphilea colchica*), Long stem oak-tree (*Quercus longipes*), Dzelkva (*Zelcova carpinifolia*), Jew-tree (*Taxus baccata*), Celtis (*Celtis caucasica*), Sachokia willow-leaved pear (*Pyrus Sachokiana*), Booth, Petz&Kirchn. (*Ramnus imeretina*), Caucasian wingnut (*Pterocaria Pterocarpa*) and others [14-16]. All these species and some others are included in the, Red List” of Georgia.

The first reserved territory (strict nature reserve) was established in Georgia in 1912 in Lagodekhi (Kakheti region). According to 1990 registry of the state forest fund of Georgia the total area of reserved territories occupied 200,591 hectare [17.18] including 15 nature reserves (168,872 hectare), 5 hunting farms (12,283 hectare) and one national park (19,436 hectare). So, the total reserved area was 200,591 hectare. The best way of preserving above sighted relict and endemic species and not only them is the enlargement of exited reserved areas and creating new once. The reserved areas in the country are spread uneven. There are some regions where there are not a single reserved area and it must be taken into account by officials.

According to the Statistical Publication of the National Statistics office of Georgia in 2018 the total reserved areas of Georgia increased up to 595,963 hectares. So, the reserved areas of the country increased almost three times from 1990 and it is about 7% of the country’s total territory. This addition took place mainly in 2004-2013. According to the new system of categories of reserved areas classified by IUCN in 2014 there are the following type of categories in Georgia [17]: 14 strict nature reserves-139,049 hectare; 11 national parks-347,921 hectares; 19 managed reserves-71,530 hectares; 40 natural monuments-2,754 hectares and 2 protected

landscape 34,708 hectare [17-18]. The new categories of IUCN are recognized by the Global Standard for defining and recording protected areas and as such are incorporated into government legislation of Georgia [19-20]. It must be noted that from 2013 until now not a hectare was added to reserved areas though there are much reserve in the country. It's enough to say that there are about 540 beautiful natural monuments that deserve proper attention and

many new objects of natural monuments can be organized and included in the list of touristic objects.

In tables 2.1, 2.2 and 2.3 are given the materials of: Cumulative growth of protected network areas in the period of 1962-2018; Forests amount in protected areas on global protected area map and Forests in protected areas by ecological domain.

Table 2.1: Cumulative Growth of the Reported Protected Area Network Since 1962

Year	Number of sites	Total area protected (Km) ²
1962	9,214	2,400,000
1972	16,394	4,100,000
1982	27,794	8,800,000
1992	48,388	12,300,000
2003	102,102	18,800,000
2014	209,429	32,868,673
2018	238,563	46,414,431

Source: UNEP-WCMC, 2018 [21]

Table 2.2: Forests in Protected Areas, based on global protected area map developed for FAO by UNEO-WCMC

Region	Forest area,2000	Forest in protected areas	Proportion of forest In protected areas
	Million hect-are	Million hectare	%
Africa	650	76	11.7
Asia	548	50	9.1
Oceania	198	23	11.7
Europe	1,039	51	5.0
North and Central America	549	111	20.2
South America	886	168	19.0
Total	3,869	479	12.4

Source: Global Forest Resources Assessment 2000. Chapter7. Forests in protected areas [22]

Table 2.3: Forests in Protected Areas by Ecological Domain

Ecological domain	Forest area, 2000	Forest in protected Area	Proportion of forest In protected area
	Million hectare	Million hectare	%
Tropical	1997	304	15.2
Subtropical	370	42	11.3
Temperate	507	83	16.3
Boreal	995	49	5.0
Total	3,869	479	12.4

Source: Global Forest Resources Assessment 2000. Chapter7. Forests in protected areas [22]

Many well-known ecologists of the world in 2019 suggested a plan to save the biodiversity of the planet and abundance of life on the earth by means of enlargement of reserved areas to 30% and to designate additional 20% as climate stabilization areas by 2030 [23]. This is an outstanding plan and must be supported by all scientists of the world working on problems of ecology, biodiversity

loss and threats to climate change. To achieve this goal, it is necessary to enlarge the existed reserved areas and create new once. It helps us to keep the average global temperature increase on/below 1.5°C. Many countries have already achieved that target [24], but others have much work to do until 2030. (Table 2.4)

Table 2.4 Terrestrial Protected Areas (% Of The Total Land Area), 2018

N	Country	%	N	Country	%
1	Austria	28.4	21	Luxembourg	40.9
2	The Bahamas	36.6	22	Malta	30.3
3	The Bahamas	36.6	23	Monaco	33.2
4	Brazil	29.4	24	Morocco	30.8
5	Benin	29.6	25	Namibia	37.9
6	Bhutan	48.0	26	New Caledonia	54.4
7	Bolivia	30.9	27	New Zealand	32.5
8	Botswana	29.1	28	Poland	39.7
9	Brunei Darussalam	46.9	29	Sao Tome and Principe	29.3
10	Bulgaria	34.7	30	Seychelles	42.1
11	Congo, Rep.	40.7	31	Slovak Republic	37.6
12	Costa Rica	27.6	32	Slovenia	53.6
13	Croatia	38.3	33	Sri Lanka	29.9
14	Germany	37.8	34	Tanzania	38.1
15	Gibraltar	32.4	35	Trinidad and Tobago	30.6
16	Greece	35.2	36	United Kingdom	28.7
17	Guinea	35.6	37	Venezuela, RB	54.1
18	Hong Kong SAR, China	41.9	38	Zambia	37.9
19	Japan	29.4	39	Zimbabwe	27.2
20	Palau	28.0		The World (2017)	14.7

Source: <https://data.worldbank.org> [25]

Presently in Georgia only 7% of the total territory of the country is occupied by reserved areas and it is not enough of course as there are many places that can be organized as reserved areas. We have only 10 years until 2030 to enlarge our reserved areas up to 30% and we must be in a hurry to do it. This decision will also be very useful for our forests altogether as they are degraded by overexploitation in last periods especially beach and coniferous forests.

Conclusion

Reserved areas maintain essential ecosystem services that increase resistance and resilience, reduce vulnerability of livelihoods against climate change. In last periods intensity and frequency of extreme events caused by global warming has risen. In last periods increased droughts and strong winds were observed in semi-arid regions of south-east part of Georgia. Climate change impacts are of great concern in those areas that are most vulnerable to them, such as: coastal areas, alpine and subalpine zones and semi-arid and arid territories. The main threats to biodiversity of Georgia today are: degradation of forests; loss of habitats and unsustainable use of biological resources. As a result, many species of flora and fauna became endangered. Only special conservation measures can save their status. The main function of reserved areas is to respond to climate change impacts and preserve biodiversity. Thus, enlargement of reserved areas will have significant effect and contribution in this regard. Presently only 7% of Georgia are occupied by reserved areas and it isn't enough in our opinion. Our primary task must be to increase our reserved areas up to 30% by 2030.

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