# GEORGIA

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## Background

As a first step towards implementing its obligations under the Kyoto Protocol, Georgia prepared an Initial National Communication in 1997–1999. Since then a number of projects have been implemented in the country, aimed at studying various aspects of climate change and preparing for mitigation and adaptation proposals.

During 2006–2009, Georgia prepared its Second National Communication (SNC) to UNFCCC. In the process, the national GHG inventory was undertaken; future climate change scenarios have been developed; and the vulnerability of different ecosystems and economic sectors to current and expected climate change has been assessed. Adaptation projects were prepared, along with the planning of GHG abatement measures, and a number of activities in raising public awareness were conducted.

Based on the assessments and results obtained in the SNC, as well as other past and ongoing projects in Georgia, short- and long-term climate change strategies have been prepared. The strategies do not yet cover the whole territory of the country, but are focused on the priority regions selected during the stocktaking exercise. In terms of measures to facilitate adequate adaptation to climate change, the vulnerability of a priority area—*Kvemo Svaneti region*—has been assessed based on future climate change scenarios.

## Summary of climate change dimensions

The national GHG inventory includes 6 sectors:

- Energy
- Industrial processes
- Solvents and other products use
- Agriculture
- Land Use, Land Use Change and Forestry
- Waste

### Land Use, Land Use Change and Forestry (LULUCF)

In Georgia in 2000, 2085.5 Gg C were removed by sinks by the LULUCF sector, whilst emitting 412.1 Gg C, and amounting to a net absorption of 1673.4 Gg C. The carbon absorption by forests amounted to 1392.6 Gg C (66%), by other woody biomass 573.7 Gg C (27.5%), and by soils 119.2 Gg C (5.7%). The forests emitted 294.7 Gg C (31.5%), other woody biomass 49.2 Gg C (11.9%), and soils 68.2 Gg C (16.5%). Accordingly, the net uptake by forests made up 1097.9 Gg C (65.6%), other woody biomass 524.5 Gg C (31.3%), and by soils 51.0 Gg C (3%). The LULUCF inventory was based upon the idea that the flow of $CO_2$ from (or to) the atmosphere was equal to changes in carbon stocks existing in biomass or soils, and that the changes in carbon stocks could be assessed on the basis of land-use change and activities, causing these changes (burning, clear felling, selected cutting, etc.). In the IPCC approach, the emissions assessment examined changes in carbon stocks caused by changes in forest and other woody biomass stocks, forest and grassland conversion to agricultural or other types of land, carbon uptake by the abandoned (managed) lands, and emissions and removals from soil.

In Figure 1 the amount of absorbed and emitted carbon (Gg C) from this sector is given for 2000, and in Figure 2 the trend of net uptake (Gg C) is shown for 1990–2006.

**Figure 1. Carbon emissions and uptake in Gg C for 2000.**

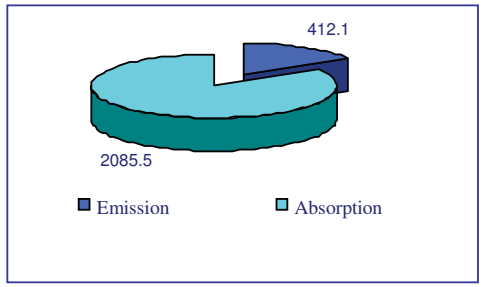
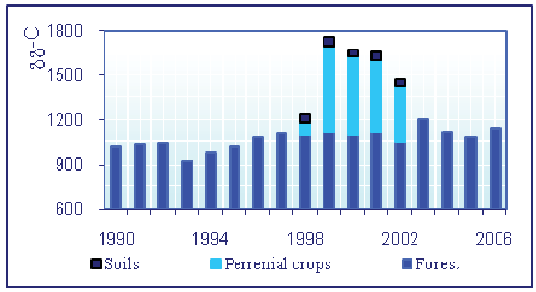



**Figure 2. Trend of net carbon uptake in Gg C from the LULUCF sector.**




## Changes in forest and other woody biomass stocks

In forests, the continuous process of $CO_2$ absorption from the atmosphere and its emission in turn takes place subject to natural and anthropogenic causes. Emissions of $CO_2$ from changes in forests and other woody biomass stocks are caused by changes in carbon stocks as a result of an increase or decrease in biomass (e.g. commercial extraction of timber and traditional consumption of fuelwood). According to the IPCC classification, Georgia is situated in a temperate climate zone in which seasonal changes in climate are well pronounced.

The territory of Georgia's forest fund equals 2.9 million hectare, of which 2.7 million hectare is covered by forests, making up 40% of Georgia's total territory (6.97 million hectare). The state economic forest fund occupies 2.4 million hectares, of which 2.3 million hectares is covered by forests. The annual increment of timber amounts to 4.6–4.8 million $m^3$, and the annual average increment of timber per hectare is 1.8 $m^3$. Total wood reserves amount to 451.7 million $m^3$.

The distribution of forests, which are massive across the national territory, is complex and full of contrasts. More than 90% of forests are situated on mountain slopes (the greater and smaller Caucasus Mountains). A significant part (40%) of them occupy very steep slopes (>35%), as a result of which the economic use of forests is very limited. Georgia is characterized by a variety of environmental conditions that promote the spread of different kinds of trees. Detailed data on the distribution of forests by kind of trees (vegetation) does not exist. Hence, they are classified only as coniferous or deciduous.

The total absorption of $CO_2$ by forests was assessed by multiplying the areas occupied by coniferous and deciduous forests by the IPCC 1996 default values of mean annual increment of biomass, and summarizing the results obtained. Calculations for 1998–2002 were made by applying the IPCC Tier 1 methodological approach, using default coefficients relevant to specific climatic zones in Georgia. For other years, the information was not available.

Calculations were performed for the areas occupied by forests having an economic function. Therefore, the data on areas covered by coniferous and deciduous forests were taken from Georgia's forest fund statistical yearbooks, compiled on the basis of inventories carried out in different years by the forestry department. As for stored timber and forest fire data, these were taken from the balance reports compiled at the end of each year for the forestry department.

In 2000, the annual increment of biomass in Georgia's forests amounted to 1392.6 Gg C, while as a result of commercial extraction and traditional consumption of fuelwood, 294.7 Gg C had been released (see Figure 3). Hence in 2000, the net absorption of carbon in Georgia's forests equalled 1097.9 Gg C, or 4025.5 Gg $CO_2$. Compared with 1990 (3738.8 Gg $CO_2$), in 2000 the net absorption of $CO_2$ had increased by 286.7 Gg $CO_2$. Figure 4 demonstrates the trend in carbon net absorption change in Georgia's forests for 1990–2006. Among other stocks of woody biomass, the areas covered by perennial crops (fruit orchards, tea plantation, etc.) were considered, for which the annual changes in carbon stock contained in green biomass were calculated.

In 2000, the net change in carbon stock contained in perennial green biomass crops amounted to -524.544 Gg C, or 1923.328 Gg $CO_2$ had been absorbed. Figure 5 shows the amounts of carbon absorbed and emitted by the perennial crops. In 2000, the net change in carbon stock in forests and other woody biomass in Georgia was 1640.4 Gg C, i.e. 6014.9 Gg $CO_2$ had been absorbed from the atmosphere. Figure 6 shows the amount of absorbed and emitted carbon from Georgia's forests and other woody biomass stock.

**Figure 3. Carbon emission and absorption (Gg C) from Georgia's forests, 2000.**

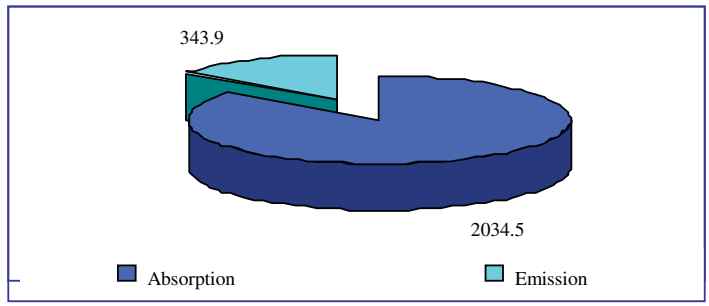



**Figure 4. Trend of net carbon uptake by forests, 1990- 2006.**

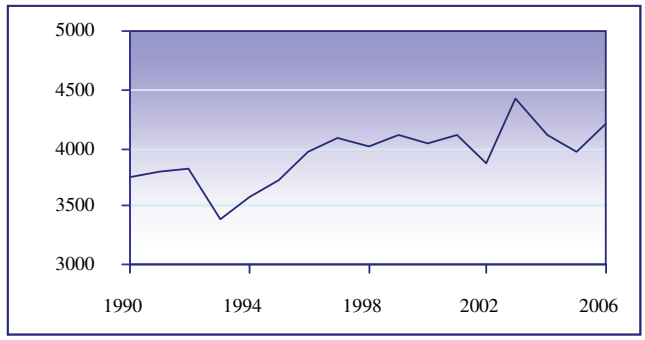


**Figure 5. Carbon absorption and emission (Gg C) from perennial crops, 2000.**

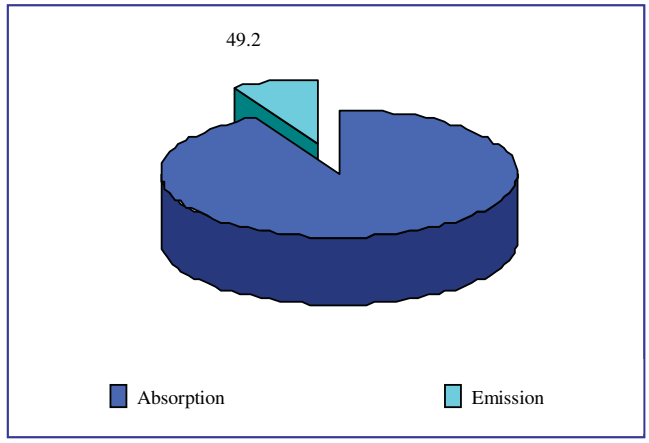
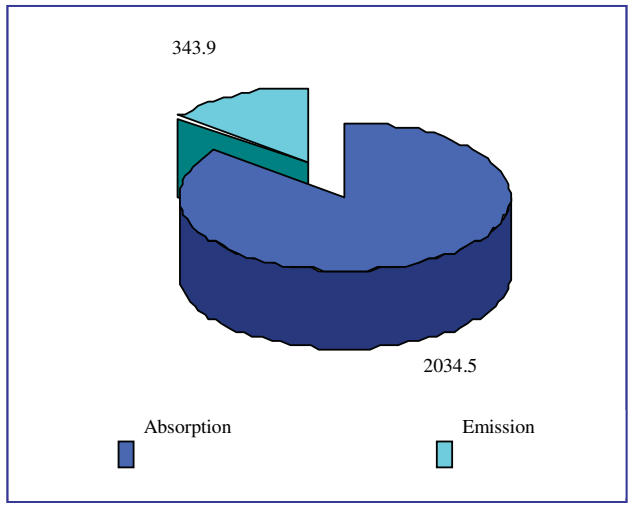



**Figure 6. Carbon absorption and emission (Gg C) from forests and other woody biomass stocks, 2000.**




## Strategy for climate-change related actions

As was mentioned above, in 2006–2009, Georgia prepared its SNC to the UNFCCC. In the process of this activity a National GHG Inventory was undertaken, anticipated climate change scenarios were developed and the vulnerability of the different ecosystems and sectors of the economy to current and expected changes in climate was assessed. Adaptation projects were prepared, along with the planning of GHG abatement measures, and a number of activities in the field of public awareness were carried out.

This strategy on climate change was prepared on the basis of assessments and results obtained in the framework of the SNC and other active or completed projects implemented in Georgia. It does not yet cover the whole territory and is oriented predominantly towards the estimation of climate change impacts on the most vulnerable systems; possible extreme events (eroded soils,

floods and landslides); preparation of adaptation measures; and the implementation of already prepared adaptation steps.

### Measures to facilitate adequate adaptation to climate change

The current change in climate elements in Georgia, and in priority regions (see below) in particular, has been assessed based on actual observation data The Vasil Gulisashvili Forest Institute elaborated a proposal to study the potential of carbon in Georgian coniferous forest ecosystems. It should be stressed that environment protection is not yet a priority for the country, and therefore the integration of climate change issues in sectoral development programmes and concepts is almost impossible. There is also a lack of national expertise on climate change; an absence of relevant scientific assessments and surveys; a lack of coordination and information-sharing between relevant projects and programmes being implemented in the country; and poor awareness among decision-makers, the private sector and the general public. The country's capacity-building needs include re-training of local experts in cross-cutting issues, encouraging young experts in their involvement with international programmes, and improving the accessibility of national statistics.

### Climate change mitigation policies and measures

The GHG inventory prepared within the SNC of Georgia for 2000–2006 demonstrated that the leading sector in GHG emission is the energy sector (including the transport subsector). That is why the main emphasis was placed on this sector in the planning of mitigation measures. However, this does not mean that other sectors, including solid waste, agriculture and forestry, were not considered in the mitigation strategy, but rather that their share (excluding forestry as a GHG sink) compared with the energy sector is insignificant in Georgia.

### Status of work by national research institutions on research for assessment of climate change

Activities included theoretical and experimental studies and fieldwork. Scientific study has addressed both fundamental and applied activities. Results have led to various recommendations. In terms of scientific research, in the past 10 years since the preparation of the INC a number of research projects have been implemented by Georgian research institutions and scientific organizations. The research was mainly conducted at the Vasil Gulisashvili Forest Institute, Institutes of Hydrometeorology, Geography, Centre of Monitoring and Forecasting, and at I. Javakhishvili Tbilisi State University. The research has included addressing problems of survey of climate change in different regions in Georgia, and the recreational-climatic division by regions of the Georgian territory.

**Table 1. Climate Change Strategy of Georgia.** (This table only shows activities with a forestry component.)

| Key strategic objective | Key target groups | Activities | Potential lead entity | Output |
|---|---|---|---|---|
| **Assessment of vulnerability to climate change and adaptation** | | | | |
| Drawing of investments and facilitating the implementation of adaptation measures in Dedoplistskaro region. Financing of adaptation projects is already initiated | Local administration; Gov' t of Georgia; Farmers; Protected territories; Local Administration | Permanent monitoring of adverse; impacts of climate change; Rehabilitation of wind-breakers; Establishing of energy forests; Rehabilitation of eroded soil; Mobilisation of farmers associations; Facilitation of proper management of pastures; Creation of efficient scheme of irrigation systems and their rehabilitation. | Local administration; Population. | Wind breaker are rehabilitated; Pilot energy groves are planned; Package of measures to rehabilitate the degraded lands is prepared; Farmers associations are created and mobilised; Proper management of pastures is introduced; Irrigation systems are rehabilitated primarily at the high risk sections. |
| Attraction of investments and promotion of the implementation of adaptation measures in Lentekhi region | Gov't of Georgia; Local administrations (Municipality); Population; NGOs. | Creation in the region of landslide Monitoring and Early Warning System; Creation of river floods Monitoring and Early Warning System; Establishment of population (households) awareness raising (informing) system and trainings on prevention measures; Implementation of pilot projects to avoid landslides (e.g. arrangement of small conformable plantations); Rehabilitation & proper management of most damaged forest areas; Restoration of landslides protection function of forest in places not affected earlier by landslides and planning of new plots; Accurate inventory of climate induced landslides and preparation of recommendation measures. | Local administrations; Population; NGOs. | Landslides monitoring service is established locally; Population in landslide endangered areas are constantly informed on potential risks and measures, that could be taken by themselves to avoid the danger; Pilot projects on planting hazelnut, as a soil fixing plant, are implemented; Rehabilitation/restoration of most damaged forest plots is systematically carried out; |
| **Mitigation of GHG emissions** | | | | |
| Promoting maximum activation of CDM in Georgia | MoE; Ministry of Energy; Ministry of Finance; Private sector. | Selection of sectors providing maximum efficiency in programmatic and sectoral approach (wind, biomass, solar energy, energy efficiency in residential sector, waste, forests); Promoting private sector activation (especially banking sector) in CDM; Improvement of CDM promoting legislative basis. | MoE (DNA) | Projects prepared in the framework of CDM are implemented; New projects are prepared. |
| Studying the local capacity for development of biomass (energy forests and other biomass) sector Assessment of its role in providing Georgia's energy system independence. Determination of the possible share of biomass in heat supply to 2020-2025 | MoE; Ministry of Energy; Cabinet of Minister; Local administrations; NGOs. | Attraction of investments to implement pilot project on biomass energy forest (Dedoplistskaro region); Preparation of new project proposals on effective utilization of biomass energy (including wood) in heat generation; Assessment of actual potential of this resource in Georgia. | MoE | Georgia's energy forest and other biomass potential are assessed; Biomass development strategy is worked out. |

| Key strategic objective | Key target groups | Activities | Potential lead entity | Output |
|---|---|---|---|---|
| | | **Public Awareness** | | |
| Education, training and raising public awareness | Public school and high school students; Teachers & lectors; Professionals, managers, other stakeholders; Policy makers; Experts; Mass-media; Farmers; Businessmen; NGOs. | Integration of climate-change related topics into education programmes; Training of scientific, technical and managerial personnel to ensure the implementation of UNFCCC Article 6; Enhancement of participation of different target groups and stakeholders in climate-change related processes; Promotion and support the preparation and dissemination of information on climate change issues targeted to the public awareness (preparation, printing and dissemination); Enhancement of policy-makers awareness of the possible results of climate change. | MoE; Ministry of Education and Science; NGOs. | National roster of experts in all sectors is continuously updating; In schools and at the relevant faculties (Chemistry, Biology, Geography, Modelling, etc.) of universities the climate change phenomenon and its implications are studied; Policy makers are systematically informed of latest results. |
| Long-term strategy (after 2020). | | | MoE. | |
| Transfer of Georgia's economy to the sustainable development principles; Working out and implementation of the National Plan on the possible mitigation of GHGs. | | | | |

**Table 2. National GHG Mitigation Strategy (2010-2025)**

| Key Strategic Objective | Key Target Groups | Activity | Potential Lead Agency | Output |
|---|---|---|---|---|
| *Short-term objectives* | Ministry of Energy; Energy Efficiency Centre; Industrial enterprises; Private sector dealing with renewable energy; Population. | GHG mitigation short-term strategy implies maximum promotion of renewable energy using the CDM potential. Energy saving measures are predominantly implemented by the population | Ministry of Environment Protection and Natural Resources; Ministry of Energy; Parliament of Georgia. | In case of active facilitation of the government and carrying out of targeted policy the consumption of energy and relevant emissions of GHGs should be reduced by 24% compared to the Business As Usual scenario, and power generation will be totally covered by renewable energy (hydro and wind) |
| | | **Fuel switching in heat energy demand** | | |
| Increase the share of biomass fuel in heat supply sector | Rural population; Government of Georgia. | Adoption of legislation facilitating the increase of biomass share in heat (cooking) energy supply; Identification of the appropriate territories for planting new energy forests; Identification of potential energy forests amongst the existing ones & preparation of proposals for their rehabilitation & management; Rehabilitation of existing (natural) energy forests and improvement management component; Establishment of PPP (Public Private Partnership) in fuel-wood supply sector; Establishment of plantation forest estates using the abandoned, eroded lands (see proposal for 40 ha plantation of bio-energy forest); Piloting the pellet/briquette industry in Georgia. | Local government; Local NGOs; Ministry of Environment and National Resources; Parliament of Georgia Department of Forestry; Private sector. | Plantations of energy forests established in Dedoplistskaro region (pilot 40 ha); Local private sector/farmers organised PPP in fire-wood production and supply sector; Pellet/briquette plant installed in West Georgia (Zugdidi region); Local population supplied by biomass fuel particularly in the remote regions (far from forested areas or settled near the protected territories) and facing the energy crisis. |
| *Long-term strategy* | Ministry of Energy; Ministry of Environment Protection and Natural Resources; Ministry of Agriculture; Department of Transport; Municipalities of big cities | In the long-run (after 2025, and possibly earlier) one of the priorities should be the increase in biomass (bioenergy) production in forest-poor regions of Georgia, transport and heat-supply sectors should be more actively involved in mitigating GHG emissions. Country's economy in general is transferred to sustainable development principle | Ministry of Environment Protection and Natural Resources, Hydrometeorology and Climate Change Administration; Ministry of Energy; Ministry of Agriculture | |

## Status of assessment and research on climate change

As mentioned above, the vulnerability of a priority area, the Kvemo Svaneti region, has been assessed based on future climate change scenarios. According to a survey of the region, as well as after consideration of the Forestry Institute's proposal, tasks and research themes were identified appropriate for international cooperative activities with FAO and other UN Agencies.

### Kvemo Svaneti region

In selecting the region most vulnerable to climate change on the territory of Georgia, attention has been focused on the Lentekhi region in view of the fact that it is typical of a mountain zone of West Georgia in terms of climatic and landscape features. Therefore, this region could be regarded as an indicator of the impact of climate-change-driven processes on natural ecosystems and the economy. At the same time, the existence of population and some sectors of the economy make it possible to plan and implement a number of adaptation measures in the region, which could serve as an example for implementing the same activities in Georgia's other mountain regions. The expected risks caused by climate change in the Lentekhi region can be summarized as:

- Increased phytopathological challenges can be expected in both crops and forests. These processes are being already observed.
- Population migration (rise in the number of eco-migrants).
- Further decline in the quality of forests.

### Study of carbon potential in Georgian coniferous forest ecosystems

Special attention is paid to the conduct of applied activities. In terms of promotion of the implementation of UNFCCC by the Vasil Gulisashvili Forest Institute, a proposal was elaborated. The main objective would be to study the carbon potential of Georgian coniferous forest species (spruce, firs, pines) ecosystems, establishment of carbon balance and the forest's role in the global carbon cycle.

The novelty of the proposal is that for the first time in Georgia, the carbon stock in spruce, fir and pine forest ecosystems (above- and below-ground biomass and soil humus) will be studied. Deposited carbon and carbon emission will be determined in coniferous forest ecosystems in general, as well in different components by age classes. A result of project implementation will be determination of the role of Georgian coniferous forests in the global carbon cycle.

## Proposed areas for cooperation

**Table 3. Proposed activities to be implemented in the Kvemo Svaneti region.**

| Key Strategic Objective | Activity | Output |
|---|---|---|
| Short-term objectives (2009–2025) | The objective of the short-term strategy is the creation of landslide monitoring systems, preparation of preventive measures for the residents in landslide-endangered zones, improvement of forest management. | |
| Carrying out of rehabilitation and proper management of the most damaged parts of forests | Selection of the most damaged areas in local forests; Preparation of a strategy for the rehabilitation of damaged areas in forests and their proper management, as well as pilot projects; Attraction of local and foreign investments to implement pilot projects through technical assistance; Carrying out permanent monitoring on the selected areas. | Permanent monitoring undertaken on forest quality, especially in the damaged areas; Package of measures prepared to be implemented for the restoration of forest quality and improvement of management; Forestry projects prepared to be submitted to the CDM. |
| Restoration of the landslide preventive function of forest ecosystem; Planting of new plots | Selection of forest plots having landslide retaining function; Preparation of project proposals for the restoration of landslide retaining forests; Creation of monitoring systems at the selected sites; Provision of local population with fuelwood. | Forest plots having special landslide retaining function selected and project proposals prepared for the restoration of such forests; Permanent monitoring at landslide retaining sites organized; Public-Private Partnerships structure organized to supply population with fuelwood. |
| Preparation of a preventive measures package to protect local forests from the intrusion of pests. | Identification of forest areas damaged by pests; Preparation of packages of measures to rehabilitate damaged plots; Preparation of preventive measure packages to protect new plots; Implementation of rehabilitation measures at damaged plots. | Forest areas damaged by pests rehabilitated; Preventive measures against pests carried out permanently. |
| Long-term strategy (after 2025) | Preparation of adaptation measures in case of climate zones transformation; Study of snow avalanche hazards increase due to climate change (both regions of Svaneti); Study of historical monuments vulnerability to climate change (both regions of Svaneti). | |

### Activities proposed by the Forest Institute

***Research Goal***

Quantitative assessment of sequestrated carbon stock in Georgian coniferous forests, and determination of parameters of carbon cycle.

***Objectives of the research***

- Determination of phytomass stock and composition of deposited carbon in coniferous forest ecosystems, segregated by species (spruce, fir, pine) and age classes (young growth (shoots), middle-aged, mature, over-aged).
- Knowledge of the quantity and distribution of CO2 and the carbon balance.

- Evaluate the results of the recent intensive harvesting activities of a huge amount of commercial wood and fuelwood, including estimating the carbon released from such forest activities. In particular assess the possibility that the Georgian forest carbon balance has changed to being a net emitter of atmospheric carbon form a net absorber

Thus, there is a priority aim to determine if Georgian coniferous forests represent a positive or negative carbon balance, and provide recommendations to the Forestry Department on quotas for annual logging to avoid loss of the carbon regulation function of forest ecosystems; increase afforestation activities; restoration of fire sites using endemic species; and assist natural restoration on burnt-over areas.

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**Annex 1. Institutions with climate change-related activities and their functions**

| Institutional structures directly related to climate change | Functions |
|---|---|
| Climate Change Administration at the Ministry of Environment Protection and Natural Resources | Coordination, direction and monitoring of policy and measures implemented. |
| National Environmental Agency at the Ministry of Environment Protection and Natural Resources | Preparation of legislative basis and proposals and their submission to the appropriate Committee of the Parliament. |
| Department of Forestry at the Ministry of Environment Protection and Natural Resources | Monitoring of measures planned.<br><br>Monitoring of the documentation to be submitted to the UNFCCC. |
| **Scientific organizations** | **Functions** |
| National Academy of Sciences of Georgia<br>Vasil Gulisashvili Forest Institute<br><br>Scientific Research Institute of Hydrometeorology<br>Institute of Geography<br>Institute of Geophysics<br>Institute of Botany<br><br>I. Javakhishvili Tbilisi State University | Data exchange, processing, scientific research and analysis. |