EUROPEAN NEIGHBORHOOD AND PARTNERSHIP INSTRUMENT (ENPI) EAST COUNTRIES FOREST LAW ENFORCEMENT AND GOVERNANCE (FLEG) II PROGRAM COMPLEMENTARY MEASURES FOR ARMENIA & GEORGIA

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Program is funded by the Austrian Development Agency (ADA) with funds of Austrian Development Cooperation and implemented by the World Bank in partnership with IUCN and WWF

SUPPORT IN SUSTAINABLE, CLIMATE RESILIENT FOREST MANAGEMENT PLANNING IN CHOKHATAURI MUNICIPALITY, GEORGIA

Executive Summary

Developed by: Merab Sharabidze

Tbilisi 2017

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Introduction

Climate change is the greatest environmental challenge of the twenty-first century. Forests play an important role in mitigating climate change by taking carbon dioxide (CO_2) and carbon monoxide (CO) - main "Greenhouse gases" (GHG), from atmosphere through photosynthesis, storing carbon in their biomass and realize oxygen.

In Georgia, the area covered by forests is approximately 2.8 million hectares which is about 40% of the country's territory. Forest plays an essential role in the economic and social life of the country. In rural areas people depend heavily on their surrounding forest resources and services for subsistence aspects of their daily life. The field survey on *Dependency on Forest Resources* conducted by under the ENPI-FLEG Program initially in 2012 and then 2014-2016 revealed that when it comes to energy sources (heating, cooking) the local population is still mainly dependent on timber forest resources. The same results were presented by the *Study on Economic and Social Impact of Unsustainable Forest Practices and Illegal Logging on Rural Population of Georgia*, carried out by Vasil Gulisashvili Forest institute during the ENPI FLEG program (Phase 1).

This high pressure on forest resources is also impacted by climate change, which is a major threat to the ecosystems and national economies. The National Forest Concept of Georgia (forest policy) states that the climate change will affect Georgia's forests severely. Doing nothing, or reacting to events as they occur, would put large areas of forest at risk of catastrophic degradation. This will lead to a large reduction in the quantity and quality of the goods and services of the forests on which many people in the country depend.

The Socio-Economic Development Strategy for Georgia - "Georgia 2020", a key socio-budgetary and economic planning document, defines directions for socio-economic policy of the state. One of the sections of this document describes the state vision on the direction of infrastructure development and at the same time, concerns possible threats of climate change. In particular, according to the strategy, "the environmental impact and negative impact of global warming on the country's economy must also be taken into consideration during the planning of infrastructure development."[1]

Considering the above mentioned, this study aims to introduce a method for climate resilient sustainable forest management planning in Georgia. The results will be used by the World Wide Fund for Nature (WWF) for development of the forest management plan for Chokhatauri municipality.

[1] http://www.adb.org/sites/default/files/linked-documents/cps-geo-2014- 2018-sd-01.pdf

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AUSTRIAN DEVELOPMENT COOPERATION

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This report has been prepared within the "European Neighborhood and Partnership Instrument East Countries Forest Law Enforcement and Governance II Program (ENPI East FLEG II) "with support of the International Union for Conservation of Nature (IUCN) and the financial support of the Austrian Development Cooperation (ADC) and in close cooperation with the IUCN ENPI FLEG coordinator and other stakeholders. The initial results of the study were presented at the international conference "Climate Change and livelihood" (Tbilisi 21-22.11.2017).

1. Goals and objectives

Goal of the study is to assess the past and current trends and develop a future scenario of climate change in Chokhatauri municipality. The study focused on understanding the capacity of forests to adapt to and mitigate climate change. Sites were selected in cooperation with the National Forestry Agency of Georgia. The ultimate goal of the study was to create a solid basis for the development of a climate resilient, sustainable forest management plan for Chokhatauri municipality.

In the context of the described study, the consultant carried out the following work:

- Obtained and analyzed existing information (including data, statistics, reports etc.), related to the forest and Climate Change in Chokhatauri municipality;
- Gathered information in order to study the past and current trends and to develop future scenarios (for 2020-2051, 2071-2100) of climate change in Chokhatauri municipality;
- Carried out a Greenhouse Gas inventory for 1988 (past forest inventory) and for the current situation (2017 forest inventory), in close cooperation with the National Forestry Agency of Georgia and World Bank forest inventory teams;
- Obtained inventory information (2010) for forest area (7900 ha), under the long-term forest use license (not subject of current inventory);
- Visited former forest land (3800 ha), which had changed land category (not subject of current inventory) after 1988, in order to obtain necessary information and conduct the data comparision of 1988 and 2017 inventories;
- Assessed the importance of Chokhatauri forests in the context of climate change mitigation and adaptation, including using necessary calculations;
- Supported elaboration of the climate resilient forest management plan for Chokhatauri municipality, including guidance on mitigation and adaptation measures.

2. Methodology

For the description of future scenarios of climate change in Chokhatauri Municipality for 2020-2051 and 2071-2100, the methodological document: *The Georgian Road Map on Climate Change Adaptation* ("The Road Map")[2] was used. The methodology employed in The Road Map closely follows the methodology described in the *ESPON Climate: Climate Change and Territorial Effects on Regions and Local Economies Report* (2011)[3]

The calculations of GHG removals/emissions in Chokhatauri forest are based on the methodology of the Intergovernmental Panel on Climate Change (IPCC) that is comprised the following key documents:

- Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories[4]
- IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (2000)[5]
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4: Agriculture, Forestry and Other Land Use (LULUCF)[6]
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories[7]

The IPCC methodology is well recognized and used worldwide. This methodology was used for the National GHG Inventories of Georgia and Borjomi-Bakuriani forest district. It is only the document where a GHG inventory was conducted to support the elaboration of local, climate change adaptive forest management plan.

Apart of the above mentioned methodological and guiding documents, reports and studies connected with Chokhatauri municipality and climate change and forest are used.

[2] http://nala.ge/climatechange/eng/home
[3] http://www.espon.eu/export/sites/default/Documents/Projects/AppliedResearch/CLIMATE/ESPON_Climate Final Report-Part_C-ScientificReport.pdf .
[4] http://www.ipcc-nGgip.iges.or.jp/public/gl/invs1.html
[5] http://www.ipcc-nGgip.iges.or.jp/public/gp/english/
[6] http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html
[7] http://www.ipcc-nGgip.iges.or.jp/public/2006gl/index.html

3. Key Findings

According to the climate scenarios of the aforementioned *Georgian Road Map on Climate Change Adaptation* document, in the 2021-2050 period average temperature in Chokhatauri municipality will increase (compare to 1990) by 1.2^{0}C, mostly in the autumn (1.9^{0}C). The absolute minimum temperature increase will be by 1.8^{0}C and the maximum will be by 2.7^{0}C. Annual precipitations will decrease on average by 3%. However, in the spring it will incease by 10%, and for other seasons it will increase, especially in the autumn (by 5%). The number of warm days will increase by 19 days and cold days (below 0^{0}C) will decrease by 17. Number of storm rains will increase (3 days in 10 years). The maximum snow cover will decrease by 11 cm and the snow cover period will decrease by 21 days.

Fromn 2071-2100, the average temperature will increase by 3.1^{0}C, in autumn by 4.3^{0}C. Both maximum and minimum temperatures will be warmer by 5.6^{0}C. Annual precipitation will decrease on average by 10%, mostly occurring in the summer (32%). The number of warm days will increase by 50 days and cold days (below 0^{0}C) will decrease by 39. The number of storm rains days will decrease by 1.6 days annually. Maximum snow cover will decrease by 24 cm and the snow cover period by 49 days.

Using the IPCC methodology, the carbon cycle has been calculated for the Chokhatauri forest. The data of the previous forest inventory from 1988 (for 55852 ha) and for the current forest inventory of 2017 for three plots has been compared: the plot from the current inventory (44 045 ha under the National Forestry Agency); the plot under the long-term license (7873 ha) and the plot which changed land category (3934 ha under the Chokhatauri municipality). The main results and comparison of the 1988 and 2017 data are given in table 1:

Table 1. Carbon accumulation changes in Chokhatauri forests for 1988 – 2017.

Forest	**Accumulated Carbon (C) th.t**	**Accumulated Carbon (C) ha/t**	**Absorption of CO_2 th.t**	**Absorption of CO_2 ha/t**
Coniferous 1988	1173	143	4301	524
Coniferous 2017	959	123.3	3516	452
Difference	-214	-19.7	-785	-72
Deciduous 1988	3411.6	72	12509	-264

Deciduous 2017	3218.4	67	11800	245
Difference	-193.2	-5	-709	-18
Total forest 1988	4584.6	82.1	16810	301
Total forest 2017	4177.4	74.8	15317	274
Total difference	**-407.2**	**-7.3**	**-1493**	**-27**

Conclusions

According to the climate change projections preented here, serious changes are expected in the Chokhatauri forest including the changing of tree species, increased vulnerability of forests to fires and tree diseases.

Table 1 show that the capacity of Chokhatauri forest as a carbon reservoir has been decreased for last 29 years. The accumulation of carbon (C) decreased by 407.2 th.t, 7.3 t per ha and on average by 14.04 t per year for the total area. The absorption of carbon dioxide (CO_2) decreased by 1493 th.t, 27 t.-per ha. These figures indicate that forests have been inappropriately managed, resulting in their degradation. To solve these problems, it is necessary to take effective measures to increase the efficiency of forest management, increase forest productivity, develop silvicultural activities and support to the natural regeneration of forest (which is a common practice). To achieve these goals, the elaboration of a climate resilient, sustainable forest management planning of Chokhatauri forests has paramount importance.

Considering the data of the two forest areas (Borjomi-Bakuriani and Chokhatauri), where carbon cycle calculations are made, the carbon accumulation in Georgia's forests is shown to be significantly reduced (on 17 t/ha, from 99 to 82 in Borjomi-Bakuriani and on 7.3 t/ha from 82.1 to 74.8 in Chokhatauri) compared to the inventories of 80-90s of the previous century. These figures place in doubt the results of the positive data of the Greenhouse Gas Inventory Report of Georgia (2006-2011), but we should take into account that both forest units are only 3.6% of the country forest territory. In order to understand the general picture, it will be necessary to calculate the carbon cycle for all other forest units of Georgia during future forest inventories and then, based on that information, elaborate climate resilient, sustainable forest management plans for all forest units.

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