IFAD financed Agriculture Modernization, Market Access and Resilience (AMMAR) Project of Georgia

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Report Index: R7

REGULATORY IMPACT ASSESSMENT (RIA) OF THE DRAFT LAW OF GEORGIA ON SOIL PROTECTION

Final Version

Prepared in accordance with the Terms of Reference for Additional Services (Regulatory Impact Assessment on Draft Soil Protection Law) under Amendment #2 of May 7, 2019 of the Contract No. AMMAR/CS/2018/164

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Abbreviations

AICC	Agricultural Information and Consultation Center (*informally known also as "Agricultural Extension Center"*) - Territorial body of MEPA at municipal level until July 2019/ since July 2019 territorial body of ARDA at municipal level
AMMAR	Agriculture Modernization, Market Access and Resilience Project of Georgia
ARDA	N(N)LE "Agricultural and Rural Development Agency" - organization subordinated to MEPA
GEF	Global Environmental Facility
GeoStat	National Statistics Office of Georgia
GIZ	German Society for International Cooperation
GoG	Government of Georgia
ha	Hectare
IFAD	International Fund for Agricultural Development
KfW	German Bank for Reconstruction and Development
Km	Kilometer
LEPL	Legal Entity of Public Law
MEPA	Environmental Protection and Agriculture of Georgia
MoF	Ministry of Finance of Georgia
MPC	Maximum Permissible Concentrations
N(N)LE	Non-entrepreneurial (Non-commercial) Legal Entity
NASLM	LEPL "National Agency for Sustainable Land Management and Land Use Monitoring" of the Ministry of Environmental Protection and Agriculture of Georgia
NASP	LEPL "National Agency of State Property" of the Ministry of Economy and Sustainable Development of Georgia
NEA	LEPL "National Environmental Agency" (*formerly known as "Hydro-Meteorological Service - HydroMet"*) of the Ministry of Environmental Protection and Agriculture of Georgia
NGO	Non-Governmental Organization
NPV	Net Present Value
RAO	Regional Agricultural Office (ROA) - Territorial body of MEPA at regional level until July 2019/ since July 2019 territorial body of ARDA at regional level

REC Caucasus	The Regional Environmental Centre for the Caucasus
RIA	Regulatory Impact Assessment
SDG/SDGs	Sustainable Development Goal/Sustainable Development Goals
NPV	Net Present Value

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Executive Summary

Land degradation as a global problem is increasing worldwide and the number of degraded land areas is progressively increasing. According to available data, 20% of arable land, 30% of forests and 10% of pastures are degraded.

More than 100,000 hectares of land have been degraded in Georgia, this threatens productivity of soils. One of the main challenges for soil conservation in Georgia is the lack of a solid legal base in this area and hence an incomplete separation of competences in the field. The general obligation of protection of soil from erosion is defined by current legislation, but the entities responsible for enforcing the legislation at the central and local levels and the scope of their responsibilities are not clearly defined. In addition, the rights and obligations of farms (farmers) involved in agricultural production and incentives mechanisms in the field of soil protection and rational use have not been established. The lack of human, material and financial resources is a major challenge in the process of soil conservation and maintenance.

Issues related to soil protection are currently regulated by the following legal acts:

- Law of Georgia On Protecting the Soil of 1994
- Law of Georgia On Soil Conservation and Recovery and Improvement of Soil Fertility of 2003

There are many legal gaps in the aforementioned laws which make it difficult to enforce the norms provided by these laws. The gaps are related to: Terminology; Incomplete definition of the responsibilities of state agencies, local municipalities and land owners/users in the field of rational use and protection of soil. In addition, the aforementioned laws do not regulate the norms related to the establishment and operation of the soil cover monitoring system. It should be also noted that the laws of Georgia on “Soil Protection” and “Soils Conservation and Fertility Recovery and Improvement” were developed in the light of different political, financial and institutional environments.

The present new draft law (on “Soil Protection”) has been developed to address these shortcomings. The main goal of the draft law is to maintain and protect of soil cover integrity on the territory of Georgia, integrated soil productivity management, protection of subalpine and alpine meadows to maintain fertile layers of soil and endemic plans and establishment of norms for the maximum permissible concentrations of harmful substances in the soil to protect human health, flora, fauna and natural resources; Clear definition of competencies (rights and responsibilities) between the state institutions and land owner/users in the field of soil protection is envisaged. In order to protect soil cover, a unified monitoring system is planned to be established for monitoring soil quality index and also soil contamination with harmful substances. When performing entrepreneurial or other activities, a fertile soil layer management mechanism will be established and issues related to soil expert will be regulated. The draft law also regulates legal relations in the field of soil protection, including rational use of soil, its protection and rehabilitation of degraded areas. The draft law applies to all land categories, regardless ownership form.

The RIA policy options assess the impact of the activities suggested by the Draft Law on “Soil Protection” on farmers and municipalities.

The following policy options are considered within this analysis:

- Option 0 - (baseline scenario) – Existing situation does not change
- Option 1 – Implementation of the measures proposed by the draft law

Below is given a detailed description of the options, including their major characteristics and the risks associated with each of them.

Option 0 - Baseline scenario

This option assumes that there is no policy change and that the draft law is not adopted. This is the status quo, which is associated with the future risk of increased soil erosion and reduced agricultural productivity.

The status quo is characterized by different types of soil degradation - water erosion, acidification, and salinization. At present, farmers are not obliged to undertake soil protection measures, therefore, the risk that soil degradation increases in the future is high.

Option 1 - Decentralized Model of Soil Protection

This Option implies taking measures to combat soil degradation directly by agricultural holdings/farmers and does not involve financial or material contributions from local government (municipal) and/or central government.

The draft law stipulates that the landowners/landusers carry out soil protection measures on the land owned or used by them. Since soil protection is associated with additional costs, at the initial stage it is important to prioritize and focus on those soils that are cultivated and are an important source of income for rural population.

Since the majority of state-owned lands are not cultivated, measures against erosion on these lands are not covered by state budget funds.

This Option is characterized by the following characteristics:

- Planning soil conservation measures
- Implementation of soil conservation measures

Option 2 - Centralized Model of Soil Protection

This Option, like Option 1, implies measures against soil degradation and also suggests that responsibilities for the soil protection can be fulfilled by the central authorities (e.g., by the newly established LEPL - National Agency for Sustainable Land Management and Land Use Monitoring /NASLM/, which has been created under the Ministry of Environment Protection and Agriculture /MEPA/, or, alternatively, by the existing N(N)LE - Agricultural and Rural Development Agency /ARDA/ - organization operating under the same ministry).

This Option is characterized by the same characteristics as Option 1, however it provides additional features such as:

- Establishment [*of a new one*] or adjustment/restructuring [*of existing one*] of a specialized body/agency at central government [MEPA] level which will be responsible for soil protection issues
- Advantages for mobilizing additional human resources
- Conducting an information campaign (on benefits from soil protection)
- Conducting soil surveys (through laboratory soil physical-chemical analysis) at national level

For both options analyses were carried out for 20-year period provided that rehabilitatiopn measures shall cover at least 101,827 heavily degraded lands.

Options were evaluated based on multi-criteria analysis. Table below summarizes the results of the multi-criteria analysis.

Plus (+), minus (-) and zero (0) are used for ranking the three options, where a plus (+) is used when there is a synergy between a criterion and the option's impact; a minus (-) when there is trade-off between the criterion and the impact; and if there is no impact at all, zero (0) is used.

Evaluation Criteria	Option 0	Option 1	Option 2
NPV of net benefit (GEL)	n/a	21,586,359 GEL	19,000,573 GEL
Rational use and protection of soil	-	+	++
Rehabilitation of degraded areas	-	+	+
Increased agricultural production	-	+	+
Feasibility	0	++	+
Mitigated conflicts of interests	0	++	+
Minimization of risks	-	+	++
Coordination between the managing bodies	-	+	++
Availability of implementation tools	0	+	++

The first and the second evaluation criteria - "rational use and protection of soil" and "rehabilitation of degraded areas" are the main objectives of the draft law. When comparing these options, Option 1 is the best because it ensures implementation of the goals set by the law.

As for "Increased agricultural production", in this case option 1 is priority because in case of this option increase of productivity is expected.

With respect to the second and third criteria, both Options have the same evaluation, as in the analysis in both Options degraded areas are rehabilitated and productivity is increased. The benefits are the same for both Options, but in the case of Option 1, they are associated with a higher risk. In addition, since in Option 2 farmers are aware of the benefits of soil conservation, in the longer term, this Option can achieve higher benefits.

In terms of "feasibility", Option 1 is preferable as it does not require any restructuring and is decentralized without any systematic change. In light of “conflict of interest” Option 1 is preferable because, unlike Option 2, farmers are required to carry out soil analysis. In terms of "minimization of the risks", Option 2 is preferable because, as noted above, in the case of Option 1, the risk that the law will not be enforced is higher. Option 1 differs slightly from the status quo, where measures to prevent soil degradation are decentralized under very low or no control from state. In light of 'coordination between governing bodies', Option 2 is most likely to meet this criterion because coordination through a separate structural unit / agency is simpler than through different stakeholders. Option 2 has an advantage in terms of "implementation mechanisms", since prioritizing the issue of protecting the soil by a separate structural unit/agency and raising funds from the central budget is easier in this Option rather than in the case of individual stakeholders.

Definition of Terms

Terms used in RIA, unless otherwise it is stated in RIA document, have the following meanings:

Agricultural holding (Holding) - An economic unit engaged in agricultural production under single management without regard to its size and legal status, and whether producing mainly for sale or mainly for self-production. Economic unit, which operates agricultural land or permanent crop tree, but during the reference year has no agricultural production, is also considered as an agricultural holding. There are two types of agricultural holding: family holding and agricultural enterprise.

Household - A group of persons who observe the rules of common living and occupy a single dwelling and are connected by the shared budget (or a part thereof), and by relative or non-relative relationships (a household may consist of one person).

Family holding - A holding operated by household. Agricultural enterprise - A holding operated by legal entity: limited liability company, general partnership, limited partnership, joint stock company, cooperative, etc.

Agricultural enterprise - A holding operated by legal entity: limited liability company, general partnership, limited partnership, joint stock company, cooperative, etc.

Farmer (Holder) - Holder, a natural or a legal person which takes basic decisions on use of resources of the agricultural holding, operates the holding and has financial and economic rights and responsibilities for the holding. There are two types of holder: household and legal entity. In case the holder is a household, under holder it is also understood household member, which manages agricultural activities in the household and makes major decisions about this activity.

Agricultural household - A household is considered to be an agricultural household when one of the members of the household is a holder (regardless largest source of income of a household is or is not income derived from agricultural production).

Operated land - Owned and rented land, except rented out land.

Owned land - Land registered with the registration certificate of ownership, as well as the land without a formal right of ownership, which is actually used by the holding as an owned land.

Rented/rented out land – Land rented from the state or rented from/to private person (natural or legal) with or without a proper contract, with the payment (money, nature, or service) or free of charge for temporary use.

Parcel - Isolated part of the land operated by the agricultural holding that is under one land tenure type (owned/rented) and is entirely surrounded by the area which is not operated by the holding.

Agricultural land - Land used (or that can be used) for the crop and livestock production. It consists of arable land, land under permanent crops, greenhouses and meadows and pastures.

Arable land - An open air land which is intended for growing temporary crops (including perennial grasses), as well as for growing seedlings.

Temporary crop - A crop with complete growing cycle less than one year. Sown perennial grasses (alfalfa, trefoil, sainfoin, etc.) also belong to this category.

Land under temporary crops - Arable land on which the temporary crop has been sown at least once during the reference year.

Uncultivated land - Arable land that has not been cultivated during the reference year due to lack of recourses, unfavorable weather conditions or natural disasters or it has not been cultivated purposefully with the aim of increasing its productivity.

Land under permanent crops - Land which is occupied by compact plantations of permanent crops (orchards, vineyards, berries, citrus or tea plantations or land under other permanent crops).

Permanent crop - Crop with more than one-year growing cycle.

Forest (Woodland) - Natural or artificial compact plantations of forest trees that have actual or potential value for production of timber or firewood or for wind protection.

Meadows and pastures - Agricultural land where naturally grown grass is used for haying and grazing.

Non-agricultural land - A part of the holding land that is not directly used for agricultural production but still plays a legible role in operation of the holding. It consists of area under yards and buildings, woodland, reservoirs for aquaculture.

Irrigated land - Land area which has been irrigated by various means (irrigation system, water channel, pipe, pump or any other artificial means), during the reference year whether it has been irrigated sufficiently or not.

Irrigable land area (water-supplied) - Land area which is provided with the central irrigation system.

Producing mainly for sale - When more than half (in value terms) of the agricultural production of the holding produced during the reference year has been sold in raw or processed form.

Producing mainly for self-consumption - When more than half (in value terms) of the agricultural production of the holding produced during the reference year has been used by the holding itself for final consumption in raw or processed form.

1. Introduction

The present Regulatory Impact Assessment of the Draft Law of Georgia on “Soil Protection” (developed in 2018-2019 by the Ministry of Environmental Protection and Agriculture) has been developed with the financial support of Global Environmental Facility and International Fund for Agricultural Development, in the framework of “the Agriculture Modernization, Market Access and Resilience Project of Georgia, by the Regional Environmental Centre of the Caucasus (with involvement of experts of International School of Economics at Tbilisi State University).

The RIA is a tool for evaluating the various Options (options) developed to solve specific policy issues. RIA is applied when a new regulation has been drafted and there is a need to assess its potential impact on the stakeholders.

RIAs aim to improve policy-making procedures through the application of various approaches, such as public involvement and accountability.

The focus of the RIA is dependent on the stage of the law-making process and is directed at improving the quality of governance by increasing the transparency and legitimacy of the regulatory process (Department of Taoiseach of Ireland, Government Buildings, 2009).

Since a significant portion of the soils in Georgia is degraded and has negative impact on soil productivity, MEPA developed a draft law on “Soil Protection”, which aims at protection of soil from degradation.

The objective of the current RIA is to evaluate the social, environmental and economic impacts of the draft law by conducting a cost-benefit analysis, alongside a multi-criteria analysis. The Regulatory Impact Assessment Research Team (hereinafter RIA Team) applied a so-called “RIA+” methodology, which considers the principles of the UN’s 2030 Agenda for Sustainable Development, and the impact of the proposed regulation on achieving its relevant Sustainable Development Goals (SDGs).

2. Procedural Issues and Consultation of Interested Parties

2.1. Organizing and Timing

Time period for Regulatory Impact Assessment (RIA) of the draft law on "Soil Protection" covered period of May 2019 - January 2020. However, RIA team had started stakeholder identification and consultation earlier in March 2019.

An inception workshop was held on May 22, 2019. The aim of the workshop was to present the RIA concept and methodology developed by the RIA team. The workshop was attended by the representatives of MEPA, Agrarian Issues and Environmental Protection and Natural Resources Committees of the Parliament of Georgia, local municipalities, science sector, NGO/CSO and independent experts. The presentations focused on a detailed description of the eight-step methodology applied in RIA, as well as the potential cost and benefit categories associated with the draft law. The RIA team also presented the influence-interest matrix of stakeholders, the timeline for stakeholder consultations, the division of responsibilities among stakeholders, and a work plan. After the presentations, the participants provided their feedback and shared their expectations regarding the RIA.

The second meeting with the stakeholders was conducted on July 15, 2019. The RIA team elaborated list of the information required for the development of the cost-benefit analysis of the draft law and presented it to the stakeholders. The meeting attendees agreed on measures for combating land degradation and on initial indicators reflecting the extent of degraded soil areas. RIA Team began collection of quantitative data to determine the costs and benefits of the measures. The meeting was attended by the representatives of the MEPA and the field experts.

Based on the collected information, RIA Team determined the costs related to enforcement of the draft law and on the 8th of August, 2019 presented to the stakeholders the preliminary results. The representatives of the MEPA and the field experts attended the meeting. The meeting participants agreed that for the explanatory note of the draft law the RIA Team would prepare cost calculation of the main measures of the draft law, list of degraded soils and data reflecting the distribution of the degraded areas by the regions of Georgia. The frequency and timing of soil recovery measures all over Georgia was also agreed in case the draft law is adopted and subsequently enacted.

Stakeholders Closing Workshop was held on November 13, 2019 at the Conference Hall of the Ministry of Environmental Protection and Agriculture of Georgia to r*eview the First Draft Version of Regulatory Impact Assessment (RIA) of the Draft Law of Georgia on "Soil Protection" and to elaborate final comments and suggestions/recommendations for development of final version of RIA document.* The main goal of the workshop was to provide stakeholders with main results of Regulatory Impact Assessment (RIA) of the Draft Law of Georgia on Soil Protection – to review the First Draft Version of Regulatory Impact Assessment (RIA) of the Draft Law of Georgia on Soil Protection and to elaborate comments and suggestions/recommendations for development of Final Version of RIA. In total 30 participants attended the workshop (18 female and 12 male), among them were representatives of the Ministry of Environmental Protection and Agriculture, Executive Office of the Parliament of Georgia, International Orgazanisations, private sector, NGOs and Academia.

The main objectives of the workshop were to: present main results of RIA on Draft Law on Soil Protectioon to participants; present main objectives of the Draft Law on Soil Protection; present Monitoring and Evaluation plan; receive comments and suggestions/recommendations from key stakeholders. It was announced that, final version of RIA in Georgian language would be developed by the end of December 2019 - based on the workshop outputs and further additional written comments and suggestions/recommendations received untul the end November, 2019.

Before elaborating the final edition of the RIA document, the final concludive working meeting was arranged in the MEPA in December 6, 2019. Representatives of MEPA's Legal Department, Land Resources Protection Division of the Department of Environment and Climate Change and Land Use Division of the Land-Use and Hydro-melioration Department were presented. On the meeting it was once again discussed the detailed cost-benefit assessment of the final results.

2.2. Consultation and Expertise

A wide range of research methods have been used for development of the RIA, literature review of existing reports and scientific articles has been conducted and required statistics and other official data have been collected.

The information collected during the analysis is given in below (table 1):

Table 1. Collected data and information

Type of data/information	Source of data/information
Soil degradation types and their spatial distribution by regions	MEPA REC Caucasus Expert Assessment
Distribution of degraded soils by soil quality-index classification and regions	MEPA REC Caucasus Expert Assessment
Existing data on decreased productivity caused by soil degradation	MEPA
Measures to combat soil degradation and their cost	MEPA Expert Assessment
Arable land use types and ownership forms	National Statistics Office of Georgia
Cost of annual and perennial crops	MEPA
The cost of land lease	Expert Assessment

The regulatory norms proposed by the draft law has impact on the wide range of stakeholders. The draft law affects many stakeholders, who are divided into four groups based on their relationship to the topic and their ability to affect the proposed regulation. The division of stakeholders into respective groups is summarized in the Interest-Influence matrix (Table 2):

Table 2. Interest – influence matrix

High Impact, Low Interest	High Impact, High Interest
• **Department of Environmental Supervision**, the Sub-Agency under the Ministry of Environmental Protection and Agriculture of Georgia • **LEPL National Forest Agency** under the Ministry of Environmental Protection and Agriculture of Georgia	• ***Hydro-melioration and Land Management Department*** of MEPA • ***Land Resources Protection Division***, Environment and Climate Change Department, MEPA • ***Anaseuli Laboratory*** – under the Scientific-Research Center of Agriculture, subordinate organization of the Ministry of Environmental Protection and Agriculture of Georgia • ***Ambient Air, Water and Soil Analysis Laboratory*** under the LEPL National Environmental Agency, subordinate organization of the Ministry of Environmental Protection and Agriculture of Georgia

Low Impact, Low Interest	Low Impact, High Interest
• ***LEPL National Food Agency***, under the Ministry of Environmental Protection and Agriculture of Georgia • ***Tbilisi State University*** • Independent Expert (Samegrelo) • Independent Expert (Imereti) • ***Mtskheta-Mtianeti Regional Agricultural Office (ROA)*** subordinated to MEPA • ***Shida Kartli Regional Agricultural Office (ROA)*** subordinated to MEPA • ***Racha-Lechkhumi and Kvemo Svaneti Regional Agricultural Office (ROA) (ROA)*** subordinated to MEPA • ***Ozurgeti Municipal Agricultural Office (ROA)*** • ***Rural Development Department of Autonomous Republic of Adjara*** • ***Iakob Gogebashvili Telavi State University*** • ***Agricultural Information-Consultation*** • ***Center (AICC) of Dedoplistskaro***, subordinated to MEPA • ***Waste and Chemicals Management Department*** of MEPA	• **LEPL Scientific-Research Centre of Agriculture** subordinated to MEPA • Independent Expert • **Biodiversity and Forestry Department** of MEPA • **Integrated Biodiversity Management, South Caucasus,** GIZ

For expert assessments telephone and individual (face-to-face) interviews have been conducted with identified stakeholders List of respondents and interview dates are presented in Annex (Table A1).

Table 3. List of Respondents and Interview Dates

#	Organization	Respondent	Occupation of the Respondent	Interview Date
1	MEPA	Nino Chikovani	Head of Land Resources Protection Office, Environment and Climate Change Department	March 28
2	MEPA	Givi Merabishvili	Lawyer	March 28
3	MEPA	Gizo Tchelidze	Head of the Hydro-melioration and Land Management Department	June 25
4	MEPA	Ekaterine Sanadze	Head of Land Use Office, Hydro-melioration and Land Management Department	June 4
5	MEPA	Alverd Chankseliani	Head of Waste and Chemicals Management	June 4
6	National Forestry Agency	Natia Iordanishvili	Deputy Head of National Forestry Agency	June 7
7	National Food Agency	Marina Ghvinepadze	Expert	June 11
8	MEPA	Neli Korkotadze	Department of Environmental Supervision	June 26
9	Anaseuli Laboratory	Temur Revishvili, Vakhtang Goliadze	Director of Anaseuli Laboratory	June 21
10	Tbilisi State University	Besik Kalandadze	Soil Geography Associated Professor, Department of Geography, Faculty of Exact and Natural Sciences,	June 11
11	MEPA	Karlo Amirgulashvili	Head of Biodiversity and Forest Department	June 28
12	Expert	Marina Shvangiradze	Expert	June 6
13	Scientific-Research Centre of Agriculture	Nodar Khatiashvili	Deputy Director of Scientific-Research Centre of Agriculture	June 5

14	Scientific-Research Centre of Agriculture	Giorgi Ghambashidze	Hear of Laboratory	June 5
15	National Environmental Agency	Elene Bakradze	Head of Ambient Air, Water and Soil Analysis Laboratory	June 6
16	GIZ	Natia Kobakhidze	Chief Advisor of Integrated Biodiversity Management South Caucasus Project	June 15
17	Expert	Ana Rukhadze	Expert	June 6
18	REC Caucasus	Ketevan Tsereteli	Project Manager	June 19
19	REC Caucasus	Maka Zumbulidze	GIS Expert	June 20
21	Expert	Besik Kalandadze	REC Caucasus Expert	June 11
22	FERRERO	Irakli Moistsrapishvili	Expert	June 25
23	Civil Society Organization “Municipal Center for Civic and Aesthetic Education”	Guram Kupatadze	Head	June 25
24	Regional Agricultural Office (ROA) of Mtskheta-Mtianeti	Nikoloz Kiknavelidze	Head	June 27
25	Regional Agricultural Office (ROA) of Shida Kartli	Mamuka Lomsadze	Head	June 27
26	Regional Agricultural Office (ROA) of Racha-Lechkhumi-Kvemo-Svaneti	Ana Kanteladze	Head	July 2
27	Rural Development Department of Autonomous Republic of Adjara	Zurab Chikhladze	Head	July 3
28	Iakob Gogebashvili Telavi State University	Manana Kevlishvili	Dean of Faculty of Agriculture	July 5

29	Agricultural Division of Ozurgeti Municipality	Akaki Glonti	Chief Specialist	July 8
30	Representative of MEPA in Dedoplistskaro	Iago Kochiashvili	Representative in Dedoplistskaro	July 10

3. Problem Definition

3.1. Value and Importance of Soil

Soil degradation is a global problem that has had a widespread and significant impact on water quality, biodiversity, and greenhouse gas emissions causing climate change.

Chemical and physical degradation of soils also have a major impact on crop yields. According to scientific studies, almost 40% of agricultural lands in the world are experiencing significant decline of crop yields caused by soil degradation (IFPRI, 2000).

The main cause of soil degradation is the destruction of soil structure due to improper agricultural practices. For its part, good (sustainable) agricultural practices cover a wide range of issues related to agricultural production, including optimal decision-making regarding the selection and alternation of agricultural crops, as well as the use of appropriate agricultural techniques for agrochemical amelioration of soils and especially for soil treatment.

Ultimately, it has a significant impact on soil fertility – qualities ensuring productivity of agricultural crops in soil.

Aspects related to environment protection

Ecosystem services – Achievements in natural resources and environmental sciences have shown that soil is the key basis for functioning of ecosystem. Soil filtrates water, provides essential nutrients for forests and agricultural croplands and helps regulating the temperature regime[1].

Deterioration of soil quality[2] - Environmentally unsustainable agricultural practices cause deterioration of soil quality. Soil cultivation on agricultural lands is one of the key factors as it increases the risk of erosion. Soil deterioration is more evident in the process of increasing intensity of using agricultural mechanization. Soil quality is negatively affected by using steep slopes for cultivation of crops, improper hydromelioration measures that disrupt the natural composition of the soil and impede its regeneration.

Climate change – Since 1850, almost 35% of greenhouse gas (GHG) is released into the atmosphere due to anthropogenic effects, it is closely linked to changes in land use. Arable lands, pastures and forest lands, as well as wetlands, have the potential to promote or through sound management strategies mitigate greenhouse gas emissions and at the same time, enhance ecosystem services. Soil stores carbon dioxide (CO2) and other “greenhouse gas” emissions in organic substances of soil. Organic substances in the soil have several additional benefits. In particular, the soil filters and purifies water, enhances water retention and storage, reduces the impact of extreme climate events, improves soil structure and reduces soil erosion.

[1] https://www.nrdnet.org/sites/default/files/why_soil_is_important_.pdf

[2] The term "soil quality" as used in the text of the evaluation document means a combination of all soil qualities and soil composition characteristics that determine its fertility. The above definition complies with the standard of the International Organization for Standardization (ISO) 11074:2015 // 2.1.15 Soil quality.

Natural environment and human health - Industrial, household and diffusive pollution threatens environment and human health[3]. Social and environmental processes emphasize the importance of arable lands and pastures around the world in providing quality food, water and air. Land degradation and desertification can affect human health both directly and indirectly. Due to expansion of land degradation and arid (desert) zones, decrease food production and drinking water resources. Possible impacts of desertification on human health include:

- The threat of improper nutrition from reduced food and water supplies
- Increased disease caused by water and poor nutrition regimes, which are associated with worsening sanitation and hygiene problems and deficit of clean water
- **Social aspect**
- Soil quality can be perceived as social capital that supplies agricultural workers with goods and services, which in the end is reflected in the results of agricultural production. Soil is the basis of agricultural production – with its biological and chemical processes[4].
- Soil degradation is caused by agricultural activities, regardless of their income level. However, if we observe relatively low-income agricultural producers (small farms / farmers) and the impact of their decisions on agricultural production, we will see an important role of soil quality improvement in poverty reduction. Agricultural production is the most important source of income for the majority of poor people in rural areas. Soil quality has a major impact on agricultural productivity so that farmers on the verge of the poverty can provide food security within their households. In many cases, improving soil resources is an important way to increase the income of the poor population.

Economic aspect

It is considered that subjects of agricultural production (farms/ farmers) maximize their expected profits by making decisions on agricultural production, such as methods and intensity soil cultivation, use fertilizers and pesticides, etc. The profit of the farm depends on the level of yield - which for its turn depends on the quality of the soil.

Food security - The availability of food depends on the quality of the soil: it is possible to produce nutritious and good quality food and animal feed only if the soils are "healthy" and "alive".

Over the past 50 years, the demand for agricultural technology and population growth has put soils under increasing pressure. In many countries, intensive production caused erosion of soils, which caused reduction of yields needed for future generations[5].

To summarize, it can be said that the soil has 6 main functions, which are divided into two categories: (1) ecological and (2) socio-economic.

[3] https://soils.org/files/science-policy/sssa-marketing-2013.pdf

[4] http://www.fao.org/3/y1796e/y1796e02.htm

[5] http://www.fao.org/soils-2015/news/news-detail/en/c/277682/

Ecological functions of soil and land are:

- Biomass production, provision of food, animal feed, renewable energy and minerals - essential function for humans and animals;

- Ability to filter and transform harmful substances and/or pathogens through which soil protects groundwater and plants from contamination- detains poisonous substances and/or transforms them into safe compounds;

- Soil is a living environment for many macro and microorganisms and therefore is a repository of genetic resources.

Socio-economic, technical and industrial functions of the soil and land are:

- Land / soil is a physical base for various technical, industrial and socio-economic buildngs, such as factories, settlements, roads, sports and recreational complexes, landfills and others;

- Land / soil is a source of mineral resources and natural resources for drinking and agricultural water;

- Land / soil represents a geogenic and cultural heritage that preserves the most important paleontological and archaeological artifacts reflecting human history and development.

There is a significant competition between the six functions and uses of soil and land. E.g. Construction of roads and factories completely eliminates the use of soil and land for any other function [9].

Thus, soil plays a vital function for humans and ecosystems.

3.2. Implications Regarding the 2030 Agenda and SDG Achievement

The economic, social and environmental benefits of soil conservation and erosion reduction contribute to the achievement of the various SDGs, discussed in more detail below.

SDG 1: No poverty - Conservation of soil and reduction of erosion increase crop yield, which is positively reflected on income and poverty reduction**.**

SDG 2: Zero hunger - Soil ensures the functioning of ecosystem services on which depend food production and its diversity. Consequently, it plays an important role in fulfilling the second Sustainable Development Goal, which is aimed at ensuring food security and satisfying nutrition needs of population.

About 95% of world food production is caused by existence of soil; The soil provides the nutrients and water that are needed to grow agricultural crops.[6]

[6] https://www.agrocares.com/en/news/soil-global-goals/

The food security of the world's growing population cannot be sustained without restoring the fertile soil layer. Improvement of soil quality, reduction of degradation and improvement of its hydrological regime supports increasing of crop yields and contribute to the diversity of food production.

SDG 3: Health and well-being - This goal of sustainable development implies ensuring a healthy life for everyone. One of the targets of this goal is to reduce mortality caused by contamination of soil with chemical and other harmful elements.

In addition, soil plays an important role in mitigating the negative impacts of climate change and contributes to the reduction of environmental pollution through carbon sequestration.

SDG 6: Clean water and sanitation – Draft Law on Soil Protection indirectly contributes to achieving this goal. Soil ensures sustainable use of water.

Protecting the fertile soil layer and reducing degradation improves the hydrological regime of the soil, which in its turn reduces the need for irrigation and the excessive use of water resources.

In addition, soil conservation and restoration improve ecosystem services, which has indirect impact on introduction of integrated water management practices..

SDG 8: Decent work and economic growth - Soil conservation and protection measures require a significant amount of human resources, which may increase the demand for workers at national and local (municipal) level.

In addition, demand for qualified agricultural specialists (agronomists, etc.) may increase. Protection of soil and reduction of erosion will also contribute to sustainable development of economy through increasing agricultural crop yields.

SDG 13: Take urgent action to combat climate change and its impacts - Soil plays an important role in the fight against climate change. Soil has the ability to have significant impact on climate change through carbon sequestration and reduction of greenhouse gas emission.

Soil protection and reduction of erosion, which improve soil quality and ecosystems, will significantly contribute to the development of modern and “conservation-based” agriculture. – The latter implies the introduction of climate change adaptation practices in agricultural practice.

SDG 15: Earth ecosystems - This Sustainable Development Goal aims to reduce desertification and restore degraded soils, therefore, this goal, like SDG 2 and SDG 13, is closely linked to the Draft Law on Soil Protection.

Soil protection and reduction of degradation will help improve ecosystem services and increase biodiversity, while controlling fertilizers, pesticides and other ameliorators for soil protection and ensuring their rational use will significantly reduce degraded land areas, which is one of the objectives of this Sustainable Development Goal.

Above-mentioned information is summarized in the diagram 1.

Diagram 1. Soil-related sustainable development goals

As for synergy and compromise, soil conservation and reduction erosion have synergies with the majority of Sustainable Development Goals and relatively few trade-offs with a number of goals. (See table 4).

Table 4. Synergy and compromises with Sustanable Development Goals

	SYNERGY	TRADE-OFFS
1 NO POVERTY 2 ZERO HUNGER	• Increased crop yields; • Reduced soil degradation and improved quality; • Increased income.	• Increased costs for soil protection measures; • Increased costs for small farmers; • Option costs that the farmer could receive by using fertile soil for other purposes.

	• Reduced soil contamination; • Reduced concentration of harmful substances in the soil.	• None.
	• Reduced irrigation needs	• None.
	• Increased employment; • Supporting sustainable economic development.	• Government spending finances on soil projects instead of other projects.
	• Reduction of carbon; • Reduction of Greenhouse Gas; • Improved soil humidity.	• None.
	• Reduction of soil degradation; • Improvement of ecosystems; • Conservation of biodiversity.	• None

Although soil protection covers quite a lot of SDGs, the following goals are most relevant:

- SDG 2 – Zero hunger
- SDG 13 – Climate action;
- SDG 15 – Life on land.

In the light of the 2030 Agenda, Georgia has developed a nationally adopted SDG matrix that features the country's major goals over several years. Table 4 shows how the articles of the draft law contribute to the achievement of these nationally adopted SDGs and defines the connection between the draft law and the national targets and indicators. (Table 5).

Table 5. Connection between Draft Law and National SDG indicators

Goals and Georgia's Adjusted Targets	**Georgia's Adjusted Indicator - Target 2030**	**Connection of Draft Law to national SDG**	**Article of Draft Law**
Goal 1. End poverty in all its forms everywhere			
1.1 By 2030, eradicate extreme poverty for all people everywhere in Georgia, currently measured as people living on less than $1.9 a day	1.1.1: Proportion of population living below the international poverty line: < 1 %.	The draft law is related to this goal in two ways: 1. Soil protection and reduction of erosion promote the increase of crop yields, thereby increasing the income from the	3. Objective of law 8 (a,b,c).Prohibition of using of highly fertile soil for non-agricultural purposes. 9.1. State management in the field of soil protection.

		sale of agricultural products	9.2. Management of local governmental bodies in the field of soil protection. 12. Obligations of the landowner / tenant to protect the soil.
Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture			
2.3 By 2030, increase the agricultural productivity and income of small-scale food producers, in particular women, family farmers, fishers, including, through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment	2.3.1: Increase the volume of production by 100%, per agricultural enterprise by class of farm/pastoral enterprise size; 2.3.2: Average income of the rural population (from employment/self-employment/agricultural product sales) per family farm: 700 GEL.	The draft law is related to this goal in the following ways: 1. Protecting soil and improving its quality has a direct positive impact on the growth of agricultural productivity, leading to increased production and increased income from sale of agricultural products; 2. Soil conservation and reduction of erosion contribute to climate change adaptation and therefore increase sustainably cultivated agricultural lands.	3. Objective of law 8. (a,b,c).Prohibition of using of highly fertile soil for non-agricultural purposes. 9.1. State management in the field of soil protection. 9.2. Management of local governmental bodies in the field of soil protection. 12. Obligations of the landowner / tenant to protect the soil.
2.4: By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters, and that progressively improve land and soil quality.	2.4.1 Proportion of agricultural area under permanent and annual crops (used by agricultural enterprises): 90%		
Goal 3. Ensure healthy lives and promote well-being for all ages			
3.4: By 2030, reduce by one third the premature mortality rate from non-communicable diseases, through prevention and treatment, and promote mental health and well-being.	3.9.1: Mortality caused by air pollution in household and environment. 65 (EU 2012) 3.9.3: Death rate related to	Protecting the soil and reducing its contamination with chemicals and other harmful elements will reduce the mortality rate from air pollution in households and	5. Norms of MPC of harmful substances in the soil 8 (e,g).Prohibitions to protect the soil. 11. Soil monitoring

	involuntary intoxication: 0.9.	the environment. This will also reduce the rate of involuntary intoxication with agricultural products. In addition, soil plays an important role in climate change and helps reduce environmental pollution.	
Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all			
8.2 By 2020 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors	8.2.1: Annual growth rate of real GDP per employed person – 2.5 %	Implementing soil protection measures requires a significant amount of human resources, which may increase the demand for labor force at the municipal and state levels. In addition, demand for qualified agronomists may increase. Soil protection and reduction of erosion will also contribute to the sustainable development of the economy by increasing agricultural crop yields.[7]	9.1. State management in the field of soil protection. 9.2. Management of local government bodies in the field of soil protection. 12. Obligations of the landowner / tenant to protect the soil.
Goal 13. Take urgent action to combat climate change and its impacts			
13.2 Integrate climate change measures into national policies, strategies and planning	13.2.1: By 2030, 15% reduction of GHG emissions compared to the Business as Usual (BAU) scenario, based on the integration of different mitigation measures in policy documents, e.g., the Low Emission Development Strategy, the	Soil protection and mitigation of erosion will help reduce the impact of climate change, which may also reflect carbon sequestration and reduction of greenhouse gas emissions. Conservation of soil and reduction of erosion, which improve soil quality	3. Objective of law 9.1. State management in the field of soil protection. 9.2. Management of local government bodies in the field of soil protection. 11. Soil monitoring. 12. Obligations of the landowner / tenant to protect the soil.

[7] Note: The draft law does not specifically indicates that additional human resources will be hired to carry out the above activities; However, given the limited available human resources, it is clear that attracting additional resources will be needed.

	Climate Action Plan for 2021-2030 and Nationally Determined Contributions (NDC).	and ecosystems, will significantly contribute to the development of modern and conservation-based agriculture, which in its turn implies adaptation to climate change in agricultural practices.	
Goal 15: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss			
15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.	15.3.1: Proportion of land that is degraded over the total area.	Protection of soil and reduction of degradation will help improve ecosystem services and increase biodiversity. In addition, controlling fertilizers, pesticides, and other ameliorants for soil protection and ensuring their rational use will significantly degraded area.	3. Objective of law. 5. Norms of MPC of harmful substances in the soil 8 (a,b,c).Prohibition of using of highly fertile soil for non-agricultural purposes. 9.1. State management in the field of soil protection. 9.2. Management of local government bodies in the field of soil protection. 12. Obligations of the landowner / tenant to protect the soil.

3.2.1. Vulnerable Groups

The efficient implementation of the draft law requires the careful identification and consideration of marginalized groups. This is further in line with the concept of “leave no one behind”, one of the main principles of the 2030 Agenda.

According to GeoStat data, the share of the population below the poverty line is 20.1% as of 2018, while the share of the population below poverty line in rural areas is higher than in the city and is 23.1%, in the city - 18% (GeoStat, 2019). It is noteworthy that the rural population is the main beneficiary of land resources and consequently their economic status is affected by land degradation.

The adoption and enactment of the draft law will most likely affect the following vulnerable groups:

- **Small farmers**
- **Medium and large farmers**

Farmers. The consultations with various groups of stakeholders, including farmers, revealed that the most vulnerable groups affected by this law are small-scale farmers, those who manage around 1 ha of land, typically divided into 2-3 plots. The 2014 agricultural census shows that 77.1% of agricultural holdings (approximately 442,000) have less than 1 ha of utilized land (National Statistics Office of Georgia, 2014)[8]. The vast majority of these farmers cannot make a living from the cultivation of such small plots of land, consequently, they lack the resources or motivation, or both, to fulfill their obligations under the draft law – collecting information on soil, conducting regular soil analysis, removing contaminated layer of soil, and performing amelioration activities.

In particular, the enactment of the draft law will affect small farmers for following reasons: (i) Providing regular information on soil conservation activities; also information on fertilizers and other chemicals which are used; Such information is usually not recorded by small farmers, as a result it will be difficult for them to perform without some incentive; (ii) removing contaminated soil layers with their own funds; (iii) Soil studies and amelioration measures require significant resources (human, financial, etc.) that farmers lack.

Medium and large farmers will face the same costs as small farmers. However, small and medium-sized farmers have more access to resources and are more able to maintain the soil, if they will be offered appropriate incentives. It should be noted that farmers often lack long-term vision and find it difficult to believe in the loss caused by soil degradation; they often focus on short-term crop growth, so investing in soil quality is less attractive for them. However, compared to small farmers, persuading medium and large farmers to take care of the soil is relatively easy.

3.3. Challenges

Land degradation is the process of reducing agricultural productivity and/or completely losing agricultural productivity, on forest areas losing the ability to reforest. [4].

Land degradation is increasing worldwide and the number of degraded land areas is progressively increasing. According to available data, 20% of arable land, 30% of forests and 10% of pastures are degraded [5]. Every year millions of hectares of land are degraded in different climatic regions of the world. In more than 100 countries around the world, 2.6 billion people are affected by the results of land degradation and desertification. This process, in its turn, covers 33% of the terrestrial surface [6].

A significant portion of the earth's land resources are unused or unproductive for a variety of reasons, totaling 18 million km^2, covering areas such as the Sahara Desert (7.7 million km^2). Other areas are located in the highlands, where their use is restricted due to harsh climates and steep slopes. Usable area is approximately 120 million km^2, which is less than ¼ of the Earth's surface. (Pédro, 1985).

1/3 of this usable area (45 million km^2) is not arable. In some cases, the climate is very dry and the atmospheric precipitation is insufficient to complete the vegetation cycle for agricultural crops.

[8] http://census.ge/files/results/agriculture/AG%20Census%20Release.pdf

In other cases the climate is very cold and the fertile soil layer is mostly frozen during the year, for example in the North America and Siberia. Thus, the total area of arable land does not exceed 33 million km^2, of which 3 million km^2 is heavily degraded and unusable for agricultural activities. [7]. Highlands constitute only 1.6% of the total land area. [8].

According to the available data, the loss of fertile agricultural land is growing very rapidly.In the EU from 1990 to 2000, a total of 882,166 ha were lost due to their other economic and infrastructural uses, which is 2% of the EU's total area. The highest rate of the loss was recorded in Germany (206,362 ha) and the lowest in Latvia (116 ha).

Soil degradation primarily affects soil which is a major constituent of soil. The soil is the upper layer of the lithosphere, characterized by fertility[9]. The organic layer of humus improves both soil structure and resistance to erosion, as well as providing long-term storage of water (moisture), nutrients (nitrogen, phosphorus, potassium) and microelements for plants. Soil provides plants with water, heat, and nutrients, thus it contributes to crop yields. [1]. Moreover, soil is a non-renewable natural resource and its degradation has a major impact on water, human health, climate change, nature and biodiversity conservation, and food safety[10] [2].

Recent observations suggest that land degradation, i.e., the loss of biological and/or economic productivity, is likely to increase further and become more acute.

Soil fertility decline occurs over time and is caused by variety of factors, such as topography and climate (natural factors), irrational use of soil, which is caused by wrong agricultural and forestry practices, erosion, unsustainable use of pastures, industrial activities, tourism or urban development, etc. (anthropogenic factors).

According to the United Nations Food and Agriculture Organization (FAO), generally, the causes of land degradation in agricultural production are as follows:[11]

- **Overgrazing** - Due to the high number of cattle and the inadequate management of pastures, the high load on natural pastures;
- **Not implementing soil protection measures** – Not implementation water and wind erosion protection measures on agricultural land, e.g. Destruction of windbreaks by cutting them and/or fires;
- **Exploitation of areas at risk of natural disasters**- Using highly sloped and poorly developed or sandy soils for agricultural purposes;
- **Incorrect crop rotation practice** – Crop rotation of seeds based on intensive production of cereal crops (e.g. wheat) that does not include legume crops causes decline of soil fertility;
- **Incorrect use of fertilizers** - In soils with low fertility, nitrogen-containing or macro-nutrient-containing fertilizers are often used, which give rapid effect, but in the medium-term perspective causes a disturbance of nutrient balance in the soil.

[9] Soil fertility is most directly related to the percentage of humus in it (1-2% to 12-15%, in the upper layers of soil), which contains both organic and mineral substances in favorable forms for plant.

[10] Soil degradation (physical, biological, chemical) is a negative process whereby the soil loses its previously accumulated organic substances - humus, causing a 55-65% decrease in soil fertility and consequently a decrease in its economic value..

[11] http://www.fao.org/3/v4360e/V4360E08.htm

- **Excessive consumption of groundwater** - Pumping large amounts of fresh groundwater, which exceeds the ability to replenish (replenish) the natural groundwater, results lowering groundwater levels.
- **Loss and/or reduction of forest cover** - Destruction of forest cover, which in turn may cause other degradation in case of improper management on these areas, e.g. cause o of water erosion on the slopes;
- **Excessive use of forest resources**- Illegal deforestation and/or excessive exploitation of forest resources.

More than 100,000 hectares of land have been degraded in Georgia[12], this threatens productivity of soils.

One of the main challenges for soil conservation in Georgia is the lack of a solid legal base in this area and hence an incomplete separation of competences in the field. The general obligation of protection of soil from erosion is defined by current legislation, but the entities responsible for enforcing the legislation at the central and local levels and the scope of their responsibilities are not clearly defined[13]. In addition, the rights and obligations of farms (farmers) involved in agricultural production and incentives mechanisms in the field of soil protection and rational use have not been established.

An important problem is the issue of registration and ownership of agricultural land. Only 45% of agricultural land is registered in the Public Register. Therefore, accurate and dynamically renewable information on private and state-owned agricultural land is currently unavailable.

The lack of human, material and financial resources is a major challenge in the process of soil conservation and maintenance.

In the process of protecting the soil, danger of its physical protection against pollution, fires and unsystematic grazing should be avoided.

Fires. The practice of burning residues of crop on agricultural plots causes erosion of soil and has a negative impact on soil fertility, which eventually results in its degradation. Burning residues after harvesting is a widespread practice caused by the following circumstances:

- There is no need of parceling crop residues after burning;
- Removal of crop residues from plots is associated with additional costs;
- There is a false assumption that burning of residual biomass increases the productivity of the land.

The fires are caused not only by farmers, but also by local and nomadic shepherds, who burn grass on pastures to facilitate faster growth of new grass. Often, fires spread over large areas through strong winds.

Overgrazing. Soil degradation promotes systematic and excessive grazing by cattle or small livestock. Due to the lack of a rational system in the field of management and use of pastures, stocking rates are mostly violated (The permissible norms for cattle and sheep per unit of pasture), it causes degradation of land/soil on pastures.

[12] Technology Needs Assessment and Technology Action Plans for Adaptation to Climate Change, Georgia, ENEP, GEF, AIT, 2012.

[13] https://matsne.gov.ge/ka/document/view/14938?publication=7

3.4. Policy Context

Georgia has joined the United Nations Convention to Combat Desertification in 1999, which was concluded in Paris in 1994 and entered into force in 1996.[14] Convention obliges States Parties to develop and implement measures for mitigating desertification and drought. In 2008 on the Conference of Parties was developed ten-year strategy (2008-2018) for implementation of the convention, based on which were created new national programs. Aim of the programs are: to help stakeholders and general public to understand the importance of protecting land resources and using them sustainably; to integrate sustainable land management methods into common management systems, etc.

Under the Convention, since 2000 Georgia has submitted five national reports to the secretariat of the convention. The most recent national report was prepared in 2014[15].

In 2010, a reporting portal PRAIS (The Performance Review and Assessment of Implementation System - PRAIS) was developed. The portal aims at collecting, sorting and evaluating national data and contributing to the development of an effective monitoring and evaluation system for taking appropriate measures to combat desertification and land degradation in the country. In 2013, the 2012-2014 reporting portal was changed. Namely, the number of indicators were decreased, impact indicators were removed, only indicators for efficiency were maintained in the portal.[16].

According to the Association Agreement with the European Union, Georgia has an obligation to bring its legislation in line with EU regulations in the field of environmental protection. The EU Directives and Regulations related to this filed are set out in the environmental section of the Association Agreement - 25 regulations and directives in total, most of them are in the process of development / enactment.

For combating desertification and land degradation, protecting soil, improving fertility and for harmonization with the Convention and the Association Agreement, it is important to refine existing legislative framework.[17] In 2015 working on new Draft Law on Soil Protection was initiated. Issues related to soil protection are currently regulated by the following normative acts:

- Law of Georgia on Protecting the Soil, 1994
- Law of Georgia on Soil conservation and recovery and improvement of soil fertility, 2003
- Order of the Minister of Agriculture of Georgia On Approval of the Recommendation of Complex Measures for Protection of Soil from Erosion, 2005

[14] http://eiec.gov.ge/%E1%83%97%E1%83%94%E1%83%9B%E1%83%94%E1%83%91%E1%83%98/Soil/Project/Current-Projects/Assessment-of-national-needs_CCD_-GEO.aspx
[15] https://www.unccd.int/
[16] http://eiec.gov.ge/%E1%83%97%E1%83%94%E1%83%9B%E1%83%94%E1%83%91%E1%83%98/Soil/Project/Current-Projects/UNDP_CCD_HARMONISATION-OF-MANDATES_GE.aspx
[17] http://eiec.gov.ge/%E1%83%97%E1%83%94%E1%83%9B%E1%83%94%E1%83%91%E1%83%98/Soil/Project/Current-Projects/Assessment-of-national-needs_CCD_-GEO.aspx

- Order of the Minister of Environment Protection and Natural Resources of Georgia on Conservation of Agricultural Land and Other Degraded Lands Pollutied from the Production of Toxic Waste and Radioactive Substances, 2005

- Order of the Minister of Agriculture of Georgia on Approving the State Program on Soil Protection and Improvement of Fertility, 2014

- Resolution of the Government of Georgia on Approval of the Second National Action Plan to Combat Desertification, 2014

- Technical Regulation on Removing, Storing, Using and Recultivating the Fertile Soil, 2013

- Technical Regulation on "Rules of storage, transportation, sale and use of pesticides and agrochemicals", 2013

- Technical Regulation on Approval of Decree for Examinations, Expertise and Registration of Pesticides and Agrochemicals in Georgia, 2013

- Technical Regulations on Rules of Exploitation of Irrigation Reservoirs, 2014

- Technical Regulation on the Rules of Technical Exploatation of Amelioration Systems, 2013

- Technical Regulations on "Determining Soil Fertility Level" and "Soil Conservation and Fertility Monitoring", 2013

- Administrative Offences Code of Georgia (Administrative violations in the field of environment protection, nature conservation, protection historical and cultural heritage), 1984

- Criminal Code of Georgia, 1999

- Criminal Code of Georgia, 2017

- Law of Georgia on Mineral Resources (known also as Law on Mining), 1996

- Waste Management Code, 2014

- Law of Georgia on Water, 1998

- Law of Georgia on Pesticides and Agrochemicals, 1998

- Law of Georgia on Regulation and Engineering Protection of the Seas, Reservoirs and River Banks of Georgia, 2000

- Law of Georgia on Defining of Land [Category] Designation and on Sustainable Management of Agricultural Lands, 2019

3.4.1. The Need for Intervention

Soil fertility is extremely important and achievable when the country has the appropriate legislative framework and effective law enforcement.

To this end, the Parliament of Georgia adopted the law on "Soil Protection"[18], and in 2003 law on "Soils Conservation and Fertility Recovery and Improvement"[19]. There are many legal gaps in the aforementioned laws which make it difficult to enforce the norms provided by these laws. The gaps are related to:

- Terminology;
- Incomplete definition of the responsibilities of state agencies, local municipalities and land owners/users in the field of rational use and protection of soil;

In addition, the aforementioned laws do not regulate the norms related to the establishment and operation of the soil cover monitoring system.

It should be also noted that the laws of Georgia on "Soil Protection" and "Soils Conservation and Fertility Recovery and Improvement" were developed in the light of different political, financial and institutional environments. Therefore, the laws require significant update.

A new draft law (on "Soil Protection") has been developed to address these shortcomings. The main goal of the draft law is to maintain and protect of soil cover integrity on the territory of Georgia, integrated soil productivity management, protection of subalpine and alpine meadows to maintain fertile layers of soil and endemic plans and establishment of norms for the maximum permissible concentrations of harmful substances in the soil to protect human health, flora, fauna and natural resources;

Clear definition of competencies (rights and responsibilities) between the state institutions and land owner/users in the field of soil protection is envisaged.

In order to protect soil cover, a unified monitoring system is planned to be established for monitoring soil quality index and also soil contamination with harmful substances. When performing entrepreneurial or other activities, a fertile soil layer management mechanism will be established and issues related to soil expert will be regulated.

The draft law also regulates legal relations in the field of soil protection, including rational use of soil, its protection and rehabilitation of degraded areas. The draft law applies to all land categories, regardless ownership form.

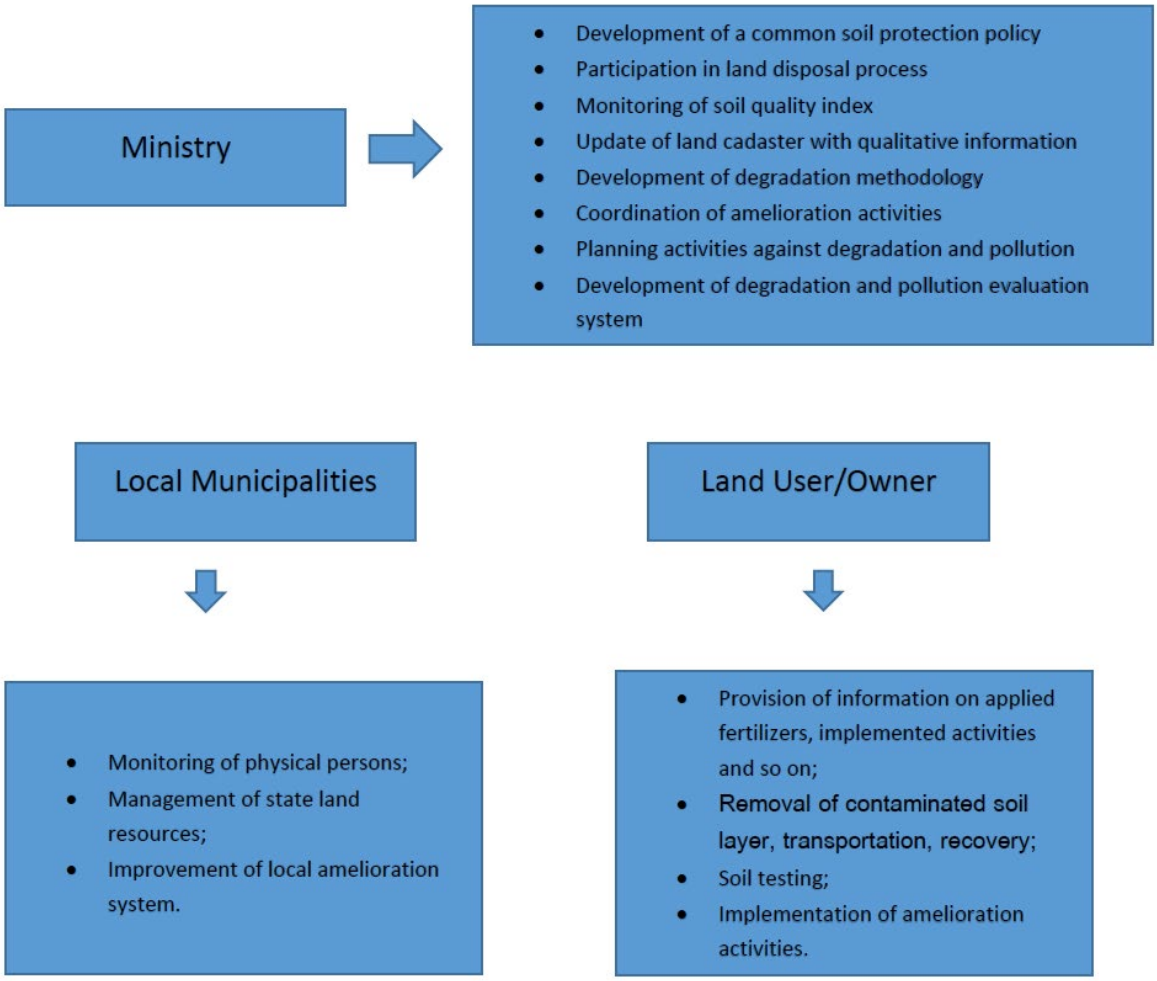
[18] https://matsne.gov.ge/ka/document/view/93874?publication=7

[19] https://matsne.gov.ge/ka/document/view/14938?publication=7

Thus, the adoption of the draft law will ensure rational use of soil cover, its protection and rehabilitation of degraded areas in the country.

The division of competences (responsibilities) is presented on Diagram 2:

Diagram 2. Division of Competences (Responsibilities) among Stakeholders



3.4.2. International Experience

Soil conservation and rational use management practices vary by country and largely depend on the degree of state intervention. Effective soil use and management regulations require the existence of an information base on the critical threshold of soil quality indicators and monitoring mechanisms. In practice, soil management can include both application of manure, reduction of fertilizer use and salinity control, as well as the introduction of a zoning system (eg, best soil protection) and its regulation requires quite complex technical and institutional changes. For achieving their goal, countries often introduce incentives rather than regulations. Incentives may vary from subsidy systems (for fertilizers in developing countries and for different soil preservation equipment in developed countries) to various forms of certifications for soil management practices (eg, bio-farming) [11]. Some systems have a stronger economic force as they are required for

accessing the market and engaging with the supermarket value chain. Effective policy implementation also requires an organized system of monitoring of soil quality indicators.

In Europe and North America (USA, Canada) there are various types of environmental taxes: tax for carbon emissions, sulfur emissions, lead emissions, waste tax, etc. However, such taxes usually do not apply to agriculture [12]. Exceptions are the tax on pesticides (Denmark, Norway, Finland, Sweden and the United States), fertilizer tax (Sweden and the United States) and taxes for manutr (Belgium, the Netherlands).

In Germany, there are federal development schemes, developed by the governments of the federal parties, that provide subsidies to farmers so that they do not harm the environment [13].

Switzerland has a three-level Sustainable Agriculture Program [12], which can be used by farmers under 5 conditions [12]:

1. Providing data on the balanced use of fertilizers relevant to agricultural crops; Also, farmers involved in livestock farming must sell manure or reduce the number of of livestock.
2. Soil should be protected from erosion - crops that cause erosion should be planted only if they are rotated later.
3. At least 7% of the farm should be allocated to non-fertilized soil, wind-shelter belts and orchards to protect diversity of species.
4. Rotation of various cultures.
5. Pesticide use should be reduced to an established risk level.

Land degradation is one of the most pressing issues for Ukraine as it has direct impact on soil fertility and agricultural productivity, which can cause significant economic losses (over $ 6 billion annually) [15]. The most common forms of degradation are water and wind erosion (about 57% of the country), flooding (about 12%), acidity (about 18%) and salinization (about 6%). According to various criteria, about 20% of territory of Ukraine is polluted with harmful chemicals.

The main causes of land degradation in Ukraine are the intense and excessive use of chemicals, climate change and natural disasters. Post-Soviet socio-economic transformations accelerate degradation of Ukraine's natural resources along with climate change impacts. The collapse of the Soviet Union was followed by the demolishment of the existing soil protection system, which could not be restored in Ukraine today. Consequently, in the existing institutional framework, there were no legislative frameworks and regulations in place to protect the soil, so responsibility for soil protection was transferred directly to agricultural producers [15].

Based on various studies, recommendations have been developed for Ukraine to establish an institutional framework for soil protection and reducing degradation:

- Identification of soil conservation measures which are tailored to small farms rather than state and collective farms and which have been successfully implemented in other developing countriess;
- Development of incentive mechanism that encourages farmers to carry out soil conservation measures;
- Conducting campaigns to raise awareness of farmers on responsibility for soil degradation and resources on land owned by them.

The experience of other countries, especially Ukraine, may be relevant to Georgia.

3.5. Review of Existing Status of Soils in Georgia

Georgia is distinguished by its diverse nature, and therefore the soil types are also diverse. There are 3 soil districts: West, East and South. For its part, soils are divided into zones and sub-zones, and then into soil regions and sub-regions. There are 48 soil regions and 169 sub-regions in Georgia (GeoStat, 2017).

Land resources has a special place in people's life and work. Humans use chemical, physical, and biological properties of land. Thus, the crop depends on the thickness of the soil layer, its mechanical composition, the presence of chemicals, id est fertility of soil.

Georgia is a mountainous country, 54% of which belongs to mountainous zone. The remaining 46% is lowland where land resources are characterized by high agricultural use and natural fertility (Geostat, 2017).

Territorial distribution of land resources in Georgia, like other natural components, is subject to vertical zonation and there are 6 zones identified (Table 6).

Table 6. Distribution of agricultural crops by vertical zonation

Zone	Elevation	Common Agricultural Crops
I Zone	Up to 250 m above sea level	Mainly predominated by subtropical cultures of western Georgia
II Zone	250-500 m	Distribution area of horticulture, viticulture, intensive field husbandry (mainly maize)
III Zone	500-1 000 m	Predominated by grain crops, natural food fields, cattle-breeding
IV Zone	1 000-1 500 m	Hay-lands and pastures, field-husbandry is weakly developed
V Zone	1 500-2 000 m	Mostly pastures and hay-lands
VI Zone	Over 2 000 m	There is no farming

Source: GeoStat 2017

In terms of useage, the territory of Georgia is divided into three parts: 1) Arable area (15.8%), 2) natural-agricultural area (forest, bushland, hay-land, pasture) (70.6%), 3) unused agricultural land (13.6%).

Agricultural lands are undergoing constant changes. The structure of the plots and their quality transformation are driven by the acquisition of new lands, active amelioration activities and so on. However, erosive processes, soil salinization or swamping, flooding and other unfavorable conditions lead to reduced agricultural fields and deterioration of the qualitative composition of

the land fund. Thus, land resources undergo continuous quantitative and qualitative changes (GeoStat, 2017).

The total area of arable land in Georgia is about 1 million hectares, out of which 802 thousand is arable and 264 thousand hectares are occupied by perennial plants State Department of Land Management of Georgia, 2004[20]). However, these data have not been updated since 2004, and 2014 census shows that agricultural land (private or leased) used by farmers, falls far short of the total area of agricultural land in Georgia (Table 7). About 130 thousand ha of agricultural lands in Georgia are provided with irrigation water and 37 thousand ha with drainage systems (Ministry of Environmental Protection and Agriculture, 2018).

Table 7. Distribution of Lands by Main Land Categories and Land Users

	Total Area	Non-agricultural land area	Agricultural Lands	Distribution of Agricultural Land by Categories				
				Arable	Perennials	Hay-lands	Pastures	Residential and commercial buildings and yards
Thousand ha	7,628.4	4,602.6	3,025.8	801.8	263.8	143.8	1,796.6	19.8
Thousand ha	Land used for farming *		787.7	377.4	109.6	300.0		--

Source: GeoStat, Statistical Publication of Natural Resources and Environment Protection of Georgia, 2017
Note: The data is based on 2004 data from the State Department of Land Management of Georgia and covers the occupied territories of Georgia - Abkhazia and Tskhinvali region
**As of October 1, 2014. Agricultural Census of Georgia 2014 (GeoStat).*

The area of one-year crops is about three times larger than the perennial crop area (GeoStat, Agricultural Census 2014).

The share of areas perennial crop areas has declined steadily over the last six years (Figure 3), which in some cases has a negative impact on the quality of the land, in particular, the land is covered with bushes, weeds, etc.

It is known that eroded soils, compared to non-eroded soils, cause weak growth and development of different crops and low quantitative and qualitative yield. It is estimated that productivity of grain crop on soils damaged by erosion is 25-70% lower on average. For example, productivity on slightly eroded soils is 85-90%, on moderately eroded soils -65-70% and 46-50% on severely eroded soils.

The rest of the loss is caused by hydro-technical damage, roads and buildings damage. Grains yield on eroded soils contain little gluten, protein, starch and other quality determining substances. Thus, soil erosion has a negative impact not only on the amount of yield, but also on the quality of the crops (Ministry of Agriculture of Autonomous Republic of Adjara, 2018).

[20] There is no updated data.

There is an obvious trend of arable land reduction in Georgia, although it is difficult to compare statistics because of the difference in data. Also, the crop area has been significantly reduced, due to many factors. This indicates not only the loss of arable land (which is difficult to discuss in the absence of necessary data) but also the abandonment of arable land, which is an important prerequisite for degradation of fertile land (Ghambashidze, 2017).

Another important factor to consider in this process is the distribution of arable land by vertical zonation which further increases the risk of land degradation under natural or anthropogenic impacts. According to the Ministry of Environmental Protection and Agriculture, only 39% of arable land is located at 500 meters above sea level, 29% at 500-1000 meters above sea level, 21% at 1000-1500 meters above sea level, and 11% above 1500 meters above sea level, which even more increases the risk of erosion processes on the abandoned agricultural lands due to the difficult terrain of the country (Ghambashidze 2017).

Losses of fertile arable land in Georgia, which is estimated to be hundreds of hectares annually, is not registered and monitored. Likewise, accurate information on degraded land and degradation trend is not available (Gambashidze, 2017).

The main causes of soil quality deterioration in Georgia [1]:

- Erosion;
- Pollution;
- Secondary swamping;
- Salinization;
- Open mining of useful minerals and construction materials;
- Incorrect and unsustainable economic activities;
- Unsustainable pasture management;
- Burning of pastures and agricultural lands;
- Excessive use of pesticides and fertilizers;
  Chaotic construction of settlements, etc.

Information on degraded areas is summarized in Table 8.

Table 8. Distribution of Arable Land by Regions and Soil Degradation Types

Region	Areas damaged by water erosion (ha)	Areas damaged by wind erosion (ha)	Area of Acidified Soil (ha)	Area of Salinized Soil (ha)
Adjara	13,020	0	3,566	0
Guria	10,905	0	10,905	0
Imereti	80,960	3,154	21,029	0
Kakheti	16,084	21,631	15,530	2,219
Kvemo Kartli	8,806	56,223	0	2,710
Mtskheta-Mtianeti	395	0	0	0

Racha-Lechkhumi-Kvemo-Svaneti	104	0	0	0
Samegrelo-Zemo-Svaneti	20,399	0	29,354	0
Samtskhe-Javakheti	19,332	3,147	0	0
Shida Kartli	14,271	1,674	0	0
Total Area of Degraded Agricultural Land (ha)	355,418			

4. Objectives of The Draft Law

4.1. General and Specific Objectives

The need for rational use of soil, its protection and rehabilitation is indicated in the Rural Development Strategy of Georgia (2017-2020)[21], Strategy of Agricultural Development in Georgia (2015-2020)[22], Climate Change Strategy of Georgia (2014)[23], Second National Action Programme to Combat Desertification[24] and also in carious regional development strategies.

The overall goal of the present draft law is to regulate the legal relations existing in the field of soil protection in the country, to ensure rational use of soil, its protection and rehabilitation of degraded areas.

The specific objectives of the draft law can be stated as follows:

- Maintenance and protection of soil cover integrity;
- Integrated soil productivity management;
- Definition of the rights and responsibilities of public agencies, land owner/users in the field of rational use and protection of soil;
- Definition of common principles for soil monitoring;
- Regulation of the legal relations in the field of amelioration;
- Protection of subalpine and alpine meadows to protect fertile layers of soil and maintain endemic plans;
- Determine the maximum permissible concentrations of harmful substances in the soil to protect human health, flora, fauna and natural resources;
- Regulation of soil export issues.

4.2. Operational Objectives

In order to achieve the general and specific objectives of the draft law, certain operational objectives have been set. These objective, together with respective indicators, are presented in Table 9.

[21] The Government of Georgia adopted the first National Strategy for Rural Development on December 30, 2016.
[22] Adopted by Government Decree No. 167 on February 11, 2015.
[23] Third National Communication of Georgia to UNCCD.
[24] Adopted by Government Decree No. 742 on December 29, 2014.

Table 9. Operational objectives and respective indicators

Objective	Indicator	Responsibility	Timeframe
1. Elaboration of common policy on rational land use, soil protection, fertility maintenance-improvement and development of amelioration system			
1.1 Adoption of the draft law	Law on "Soil Protection of Georgia" and subsidiary legislation	MEPA	Completed by 2019
1.2 Planning and implementation of scientific-research works in the field of soil protection	Number of strudies conducted	MEPA	To be determined
1.3 Creation of soil degradation and pollution assessment systems	Soil degradation and pollution assessment systems	MEPA	To be determined
1.4 Development of unified field and laboratory methodology for soil degradation and fertility indices	Unified field and laboratory methodology for soil degradation and fertility indices	MEPA	To be determined
1.5 Collection and processing of data on soil qualitative indices in a unified geo-information system of land cadaster	Soil qualitative indices database	MEPA	To be determined
1.6 Soil passportization (inventory)	Passported soil area (ha)	MEPA	To be determined
1.7 Definition of common principles for soil monitoring;	Soil monitoring plan	MEPA	To be determined
1.8 Planning measures against soil degradation based on the soil passportization	National programme on planning soil protection measures	MEPA	To be determined
2. Integrated Soil Management			
2.1 Implementation measures against soil degradation based on the soil passportization	Rehabilitated soil area (ha)	MEPA	To be determined
2.2 Reduction of soil erosion	Eroded land area (ha)	MEPA	To be determined
3. Management of Fertile Soil Layers			
3.1 Implementation of rehabilitation works	Volume of stored fertile layer of soil (cubic meter); Rehabilitated soil area (ha)	MEPA	To be determined
3.2 Soil export	Quantity of exported fertile layer of soil (cubic meter);	MOF	To be determined
4. Enforcement of restrictions for soil protection			

4.1 Provision of fines for non-agricultural use of highly fertile soils, removal of fertile layer of soil for commercial purposes and other illegal activities	Number of fines issued	MEPA	To be determined
5. Soil Monitoring			
5.1 Control over landowners to fulfill the soil protection requirements of Georgian legislation	Crop production as a result of soil protection (kg/ha); Degraded land area (ha); Cultivated soil area (ha); Number of conducted soil tests	MEPA	To be determined
5.2 Registering degraded soil areas	Degraded land area (ha)	MEPA	To be determined
5.3 Update of data on soil qualitative indices in a unified geo-information system of land cadaster	Updated information on soil qualitative indices	MEPA, Municipalities	To be determined
6. Increase Agriculture Production			
6.1 Ensure the increase of agricultural production of crops	Crop production as a result of soil protection (kg/ha);	MEPA, GeoStat	To be determined
6.2 Facilitate coordination in amelioration field in order to harvest more productive yield	Irrigated soil area (ha)	MEPA	To be determined

5. Policy Options

The RIA policy options assess the impact of the activities suggested by the Draft Law on “Soil Protection” on farmers and municipalities.
The following policy options are considered within this analysis:

- Option 0 - (baseline scenario) – Existing situation does not change
- Option 1 – Implementation of the measures proposed by the draft law

Below is given a detailed description of the options, including their major characteristics and the risks associated with each of them.

Option 0 - Baseline scenario

This option assumes that there is no policy change and that the draft law is not adopted. This is the status quo, which is associated with the future risk of increased soil erosion and reduced agricultural productivity.

The status quo is characterized by different types of soil degradation - water erosion, acidification, and salinization. At present, farmers are not obliged to undertake soil protection measures, therefore, the risk that soil degradation increases in the future is high.

Option 1 - Decentralized Model of Soil Protection

This Option implies taking measures to combat soil degradation directly by agricultural holdings/farmers and does not involve financial or material contributions from local government (municipal) and/or central government.

The draft law stipulates that the landowners/landusers carry out soil protection measures on the land owned or used by them. Since soil protection is associated with additional costs, at the initial stage it is important to prioritize and focus on those soils that are cultivated and are an important source of income for rural population.

Since the majority of state-owned lands are not cultivated, measures against erosion on these lands are not covered by state budget funds.

This Option is characterized by the following characteristics:

- Planning soil conservation measures
- Implementation of soil conservation measures

Planning of soil protection measures

This activity involves identifying the types of soil erosion by region and selecting relevant measures. This activity also determines the frequency of selected activities and consideration of costs. The average size of area to be recovered during the year will also be determined by regions.

Implementation of soil protection measures

This activity involves carrying out selected activities on degraded soil. With respect to this Option, there is a risk that farms will not or cannot fulfill their obligations due to lack of funds and/or motivation. There is also a risk that the state will not be able to enforce the law properly due to limited resources.

Option 2 - Centralized Model of Soil Protection

This Option, like Option 1, implies measures against soil degradation and also suggests that responsibilities for the soil protection can be fulfilled by the central authorities (*e.g., by the newly established LEPL - National Agency for Sustainable Land Management and Land Use Monitoring /NASLM/, which has been created under the Ministry of Environment Protection and Agriculture /MEPA/, or, alternatively, by the existing N(N)LE - Agricultural and Rural Development Agency /ARDA/ - organization operating under the same ministry)*.

This Option is characterized by the same characteristics as Option 1, however it provides additional features such as:

- Establishment [*of a new one*] or adjustment/restructuring [*of existing one*] of a specialized body/agency at central government [MEPA] level which will be responsible for soil protection issues
- Advantages for mobilizing additional human resources
- Conducting an information campaign (on benefits from soil protection)
- Conducting soil surveys (through laboratory soil physical-chemical analysis) at national level

Establishment/adjustment of a specialized body/agency responsible for soil protection at central government level

International experience shows that in some countries soil protection is centralized and implemented by a separate agency (specialized organization). Establishing a separate agency/organization is usually costly, however it has several types of benefits. Among them are:

- Working with one agency/organization on soil protection issues reduces risk of duplication of activities when soil protection responsibilities are dispersed among different agencies;

- Separate specialized agency/organization can represent and defend its interests more effectively in a process of formulation of state budget. Financial support for carrying out environmental measures (including soil protection measures) is often difficult and in case of existence of separate specialized agency/organization, budgetary support will be more systematic.

This Option implies that the soil protection function can be assigned to for example to the newly established NASLM (currently in the early stages of development), or the existing ARDA, both operating under MEPA.

It should be noted that according to the Law On Defining of Land [Category] Designation and on Sustainable Management of Agricultural Lands of 2019, the newly established NASLM covers issues related to soil protection, such as: a) Producing of land balance sheets and accounting of agricultural land resources and creation of a unified database; b) Participating in the development and implementation of state policies for the use of land for the purposes intended and protection of agricultural land resources and participation in relevant state programs; c) Participating in planning measures to combat desertification, land degradation and improve soil fertility; d) Participating in the planning and implementation of windbreak management activities, etc. Therefore, it would be advisable for the NASLM to collect information on land resources and soils and soil protection measures in the process of land surveys. This approach would save information gathering costs.

Mobilizing additional human resources

The proposed Option involves adding at least one position – a person specializing in soil sciences. This kind of position would secure provision of analysis and processing of information collected on soil degradation measures, as well as planning of soil protection measures.

Conducting information campaign

It is important to raise awareness on the importance of soil protection among farmers - in order to ensure that agricultural holdings/farmers spend more financial resources on measures against degradation. Therefore, Option 2 envisages information campaigns on the importance of soil protection measures. The campaign may be potentially conducted by LEPL - Environmental Information and Education Center (or alternatevely by ARDA). It is important to involve representatives of local authorities in this campaign they are better informed about local needs and opportunities. Local government officials should play a role of a linker between central government and local farmers/population.

Conducting laboratory studies necessary for the physical-chemical analysis of soils in the country

Option 2 also involves soil laboratory studies to determine exactly what measures are needed to protect the soil in the regions. At this stage, soil laboratory analysis cover agricultural lands in fragmented way and the MEPA has allocated GEL 20,000 per year for this acrtivity (based on 2019 data), which is insufficient to cover soils across the country. Futhermore, farmers are also involved in financing soil laboratory analysis for their own purposes (using express-laboratory methods) and with their own funds, partially because such analysis is required for participation in agricultural programs run by MEPA. However, it is noteworthy that soil laboratory analysis is not conducted systematically by farmers - although it is needed to optimize production, prevent contamination by excess fertilizers, and identify the causes of low crop yields and diseases.

As for the risks, in the case of Option 2 the greatest risk is the limited availability of financial resources from the state budget. There is a risk that additional funds mentioned above will not be mobilized from the state budget. In addition, there is a risk that the newly established NASLM (currently in the early stages of development), or alternatively ARDA, both under the MEPA will not implement additional soil protection related functions.

6. Analyses of Impacts

6.1. Methodological Approach

The objective of this analysis is to identify the main quantitative and qualitative impacts of the suggested options for the various stakeholders in comparison to the baseline scenario. Thus, the analysis considers the incremental costs and benefits of Options 1, with regard to the baseline scenario. The option discussed in the analyses is based on general (table 10) and specific assumptions.

Table 10. Macroeconomic variables

Variable	Value	Source
Discount rate	0.0807	National Bank of Georgia (average real interest paid on a 10-year government bond)
Inflation Targeting Rate	0.03	National Bank of Georgia

The assumptions listed below are developed based on literature revision and experts consultations:

Framework

1. All values are real and prices are constant;
2. The analysis covers 20 years;
3. There are two types of stakeholder in the analysis: farmers (households and legal entities) and municipalities
4. There is no technological adoption by farmers, and crop production mix does not change over the years by the regions;
5. The analyses covers measures against degradation for arable lands and lands cultivated with perennial crops and does not include degraded pastures;
6. Degraded arable land and perennials are distributed in the same proportion to state and private ownership as arable land and perennials are generally distributed between state and private individuals;
7. Non-operated state land gradually becomes operated as farmers rent 1% of state land annually in each region;
8. Since the financial resources of the farms and the state are limited, measures agains degradation are taken only on cultivated land (private property or lease) which are operated by farmers; There is no rehabilitation of farmers operated land which is not cultivated; Furthermore, state land is not rehabilitated as well unless it is leased.

Degraded Soil Area

1. The analysis assumes measures to combat soil degradation only on very low quality soils with a quality-index score ranging from 1 to 40[25];
2. The analysis includes implementation of measures against water erosion, salinization and acidification; Measures against wind erosion are not foreseen in the analyses as the issue is regulated by another draft law (Draft Law of Georgia on Windbreaks);
3. 58% of degraded land is private property and 42% state property;
4. 65% of farmers operated land is cultivated while only 25% of state operated land is cultivated[26].

Costs and Benefits

1. Only 50% of the costs of the measures against soil degradation is included in the analysis, since it is assumed that farmers currently carry out certain measures (fertilization, crop rotation, etc.), so 50% of the cost in the analysis is considered to be an additional cost;
2. The cost of measures against soil degradation increases by 1% each year as the later the soil is rehabilitated, the more degraded it is;
3. In the absence of measures against soil degradation for 20 years, productivity of agricultural crops will be reduced by 8%; the annual rate of decline in productivity is 0.4%.
4. At the initial stage of the analysis, the types of degradation relevant to each region were determined based on maps created under the Cadastre and Land Registration project co-funded by KfW.
5. The information provided on these maps was amended based on expert assessments and was determined the specific share of each species in total degradation (Table 11).

Table 11. Share of erosion types in total erosion (without wind erosion) by regions

Region	Share of erosion type in total erosion excluding wind erosion					
Adjara	Water erosion	79%	Acidity	22%		
Guria	Water erosion	50%	Acidity	50%		
Imereti	Water erosion	79%	Acidity	21%		
Kakheti	Water erosion	48%	Acidity	46%	Salinity	7%
Kvemo Kartli	Water erosion	76%			Salinity	24%

[25] According to quality-index schoring system, low (1-40 points), medium (41-60 points) and high quality soils (61-100 points) are identified.

[26]These proportions are calculated based on total arable land area, perennial and annual crop areas.

Mtskheta-Mtianeti	Water erosion	100%				
Racha-Lechkhumi-Kvemo Svaneti	Water erosion	100%				
Samegrelo-Zemo Svaneti	Water erosion	41%	Acidity	59%		
Samtskhe-Javakheti	Water erosion	100%				
Shida Kartli	Water erosion	100%				

After determining the percentage of distribution of the degradation in species, the appropriate areas for this distribution were adjusted based on the KfW project data on soil bonitization.

Based on the assumptions described above, at the initial stage of the analysis the type of degradation relevant to each region and the corresponding areas of the degradation types were determined (Table 12).

Table 12. Distribution of arable land according to degradation relevance for each region

Region	Water Erosion (ha)	Acidification (ha)	Salinization (ha)	Total (ha)
Adjara	13,020	10,905	-	23,925
Guria	10,905	21,029	-	31,934
Imereti	80,960	15,530	-	96,490
Kakheti	16,084	-	2,219	18,303
Kvemo Kartli	8,806	-	2,710	11,516
Mtskheta-Mtianeti	395	-	-	395

Racha-Lechkhumi-Kvemo-Svaneti	104	29,354	-	29,458
Samegrelo-Zemo-Svaneti	20,399	-	-	20,399
Samtskhe-Javakheti	19,332	-	-	19,332
Shida Kartli	14,271	10,905	-	25,176
Total (ha)	**184,277**	**87,723**	**4,928**	**276,928**

The table shows that highly degraded soil throughout Georgia amounts to 269,589 ha and the largest share comes on water erosion (184,277 ha).

As in both alternatives only the soil used by agricultural farms / farmer is being recovered cultivated at the same time, in the analysis is included not only 269,589 ha but only privately owned (58%) cultivated area (65%). The area to be included in the analysis by regions is given in Table 13:

Table 13. Acreage considered in the analyses for implementation of land rehabilitation measures

Region	**Area to be recovered (ha)**
Adjara	6,265
Guria	8,238
Imereti	38,522
Kakheti	12,779
Kvemo Kartli	4,350
Mtskheta-Mtianeti	149

Racha-Lechkhumi-Kvemo Svaneti	39
Samegrelo-Zemo Svaneti	18,792
Samtskhe-Javakheti	7,302
Shida Kartli	5,390
Total	**101,827**

Measures against soil degradation and their costs (per ha) are summarized in Table 12 (more details are given also in Annex A2).

Table 14. Measures against soil degradation considering degradation type

Degradation Type	Measures Against Soil Degradation	Average Cost of the Measure (GEL/Ha)
Acidification	Liming	3,000
These measures are relevant for all types of degradation	Application of organic fertilizers	2,100
	Crop rotation	550
	Mulching	5,600
	Use of nitrogen, phosphorus and potassium fertilizers (NPK)	4,800
	Seeding	450
	Composting	130
Salinization	Chemical Ameliorative Measures (application of gypsum and washing out)	3,129
	Agro-Biological Method and Agro-Technical Measures	4,800
Water Erosion	Drainage Ditches	15,000

Table 13 provides the total cost of carrying out some of the measures, assuming that the farms are already carrying out certain measures, 10% of the cost is used in the analysis.

In addition, given that a number of measures can be used to combat several types of degradation, the average cost of measures is calculated for each type of degradation.

Given that a number of measures can be used against various types of degradation and some of them are currently undertaken by farms, the costs applied in the analysis are summarized in Table 15.

Table 15. Costs applied in analysis of measures against degradation

Degradation Type	Costs Applied in Analyses
Acidification	3,204
Salinization	3,686
Water Erosion	9,204
Wind Erosion	7,874

The above-mentioned values represent an additional expense for the farm compared to the status quo.

The normative value of agricultural crops used to determine the benefits of measures against soil degradation are presented in Table 16.

Table 16. Normative Cost of Agricultural Crops per Ha

Agricultural Crop	Normative Cost (GEL/Ha)	Agricultural Crop	Normative Cost (GEL/Ha)
Wheat	1500	Forage Crops	600
Maize	2250	Beans, Pea and Oat	2367
Barley	1320	Orchards	19240
Sunflower	2300	Berries	17100
Potato Plant	15000	Vineyard	11500
Vegetables	16060	Red grape vineyard	15000
Melon	10000	Citrus	11800

Average Discounted normative value of agricultural crops per ha has been defined for each region (table 17).

Table 17. Average Discounted Normative Value of Agricultural Crops per ha for Each Region

Region	Discounted Normative Value
Adjara	11,958
Guria	8,596
Imereti	5,584
Kakheti	5,902
Kvemo Kartli	6,900
Mtskheta-Mtianeti	7,398
Racha-Lechkhumi-Kvemo-Svaneti	8,489
Samegrelo-Zemo Svaneti	10,035
Samtskhe-Javakheti	7,936
Shida Kartli	9,727

6.2. Qualitative Impact

The qualitative impacts of the selected options are summarized in Table 18.

Table 18. Qualitative Impacts of the Options

Impact	Option 0. Baseline Scenario	Option 1
Administrative/ State budget	Currently, there are no financial resources allocated for measures agains soil degradation in the state.	The draft law has both positive and negative effects on the state budget. Positive effects: • Income from fines for illegal activities; • Decreased carbon footprints. On the negative side, there might be public administrative costs which include: • Developing the state program; • Additional human resources; • Transfers to municipal budgets including: ○ Additional human resources; ○ Capacity building; ○ Awareness raising; ○ Monitoring on state and private land.
	Currently, the development of the agricultural sector in Georgia is	Protection of soil and reduction of erosion has significant economic impact: • Increased crop production;

Economic	hindered significantly by soil erosion.	• Increased food production; • Increased production income; • Decrease in irrigation need; • Increased employment opportunities generated through planning and implementation of soil protection measures; On the negative side, there might be Option cost, which farmer could receive for non-agricultural use of highly productive soil.
Social	There are farmers who do not implement soil protection measures and use chemical fertilizers and pesticides extensively to increase productivity. There are also farmers who use agricultural land for non-agricultural purposes.	There are potentially both positive and negative social impacts associated with this option. On the positive side, there is a favorable effect on the livelihoods of the poor rural population, those who are mostly involved in agriculture and depend on agricultural production. On the negative side, the reform might worsen the socio-economic conditions of vulnerable groups of society if it becomes their obligation to buy soil protection products and to implement the measures and will be fined in case of soil quality deterioration: farmers have to conduct soil testing, implement appropriate measures, which increases their costs.
Environmental	Soil erosion not only deteriorates agricultural crop production, but also damages ecosystem services such as carbon sequestration and greenhouse gas emission reductions.	Reduction of soil erosion has significant positive impact on the environment. It improves the microclimate and also plays an important role in reduction of t climate change. Implementation of soil protection measures improves soil quality and humidity. Soil has considerable positive effect on the environment, resulting in carbon sequestration and greenhouse gas emission reduction.
Farmers	There are farmers who do not implement soil protection measures and use chemical fertilizers and pesticides extensively to increase productivity. There are also	The bill has positive and negative impact on farmers. The positive impact is reflected in the increase of crop productivity, which has a positive impact on the income from production. On the other hand, farmers need to conduct soil analysis, implement appropriate measures that increasse their costs.

	farmers who use agricultural land for non-agricultural purposes.	

6.3. Cost-Benefit Analyses

In cost-benefit analyses, the incremental costs costs and benefits associated with each option are quantified in relation to the status quo (current situation).

Option 0 – Status Quo
There are no quantifiable costs or benefits associated with the baseline scenario.

Option 1 – Decentralized Soil Protection Model (Implementation of the soil measures specified by the draft law)

Quantified costs or benefits associated with the baseline scenario are described below.

Quantified Costs

Farmers (Households and Legal Entities)

- **Measures against soil degradation on private land.** The cost depends on the type of the measure and also varies by regions. It ranges from 995 GEL/ha to 1,573 GEL/ha. Annual average cost increase is 1%.
- **Measures against soil degradation on leased land.** The cost depends on the type of the measure and also varies by regions. It ranges from 995 GEL/ha to 9,204 GEL/ha. Ammount of total cost depends on size of total area.
- **Rent for leasing of land.** The lease rent is 100 GEL/ha per year.

Municipalities

- Since it is assumed that state lands are not rehabilitated except for the leased land, the municipalities don't have any cost for soil rehabilitation activities.

Quantified Benefits

Farmers (Households and Agro-Enterprises)

- **Productivity increase on private lands.** In case of soil rehabilitation measures implementation, soil productivity increases by 0.04% per year. The increase rate is the same for all the regions, but productivity varies by region depending on the crop.

- **Productivity increase on leased lands.** In case of soil rehabilitation measures implementation, soil productivity increases by 0.04% per year. The increase rate is the

same for all the regions, but productivity varies by region depending on the crop. This benefit is calculated for the leased land.

Municipalities

- **Revenue from leasing the land.** The lease fee is 100 GEL/ha per year and 1% of degraded state land is leased every year.

Option 2 - Centralized Soil Protection Model

The quantitative estimated costs and benefits associated with this Option are described below.

Quantitative assessment of costs

Agricultural farms (agricultural households and legal entities / agricultural enterprises)

- **Measures to combat soil degradation on privately owned land.** This cost depends on the type of measure and also varies by region. It ranges from 995 GEL / ha to 1,573 GEL / ha
- **Measures to combat soil degradation on leased land.** This cost depends on the type of measures and varies by region and ranges from 995 GEL / ha to 1,573 GEL / ha
- **Rent for leasing of land.** The lease rent is 100 GEL / ha per year.
- **Soil analysis cost.** These costs include the price of soil analysis which is 75 GEL / ha. The number of soil analyses was determined by dividing the total area by the total recovery area (1.37 ha).

Municipalities

- Since it is stated that state-owned land will not be restored except for leased land, municipalities do not have to spend for implementation of measures to combat land degradation.

Central government

- **Additional human resources:** At the central government (MEPA) level, one additional permanent staff will be hired to implement soil conservation and soil fertility restoration and improvement policies. The annual salary for additional staff is GEL 9,600.
- **Awareness raising:** Soil related awareness raising activities are financed from the central state budget and for these activities 15,000 GEL is allocated each year.

Quantitative assessment of benefits

Agricultural holdings (agricultural households and legal entities/agricultural enterprises)

- **Increase in productivity on privately owned lands.** In case of conduction of degradation measures, soil productivity increases by 0.04% per year. Growth rates are the same for all regions, and productivity varies by region and depends on variety of crops grown in each region.

- **Increase in productivity on lands leased from municipalities.** In case of conduction of degradation measures, soil productivity increases by 0.04% per year. The growth rate is the same for all regions, and the absolute value of benefits varies by region and depends on the crops grown in one or the other region.

Municipalities

Income from leased lands. The lease rent is 100 GEL / ha per year and 1% of state-owned land is leased annually.

6.4. Summary

The results of the cost-benefit analysis and qualitative analysis are summarized in the table (Table 19) and diagrams (diagram 4, 5, 6 and 7) below.

Table 19. Summary of the Results

	Option 1	Option 2
Quantitative impacts (NPV of net benefits)	21,586,359 GEL	19,000,573 GEL
Qualitative impacts (if quantitative not possible)	**Positive:** 1. Creation of legal base for soil conservation; 2. Elimination of terminological gaps with respect to old legislation and the status quo. **Negative:** 1. Costs higher than the status quo for farmers which is caused from their soil conservation related obligations; 2. Lack of coordination between the agencies responsible for soil protection and individuals; Risk that the soil will not be properly protected and appropriate measures will not be carried out by farmers.	**Positive:** 1. Creation of legal base for soil conservation; 2. Elimination of terminological gaps with respect to old legislation and the status quo.; 3. Prioritizing the issue of soil protection separately in the activities of the Agency; 4. Improved coordination; 5. Reduction of the risk of duplication of activities;

		6. More opportunities to obtain financial resources for soil protection; 7. Raising awareness of the population on benefits of soil protection; 8. There is a lower risk that the law will not be enforced than in the case of the first alternative. **Negative:** 1. Relatively high governmental spendings compared to Alternative 1; Relatively high costs for farmers compared to Alternative 1.

Diagram 3. Total discounted value of benefits and costs

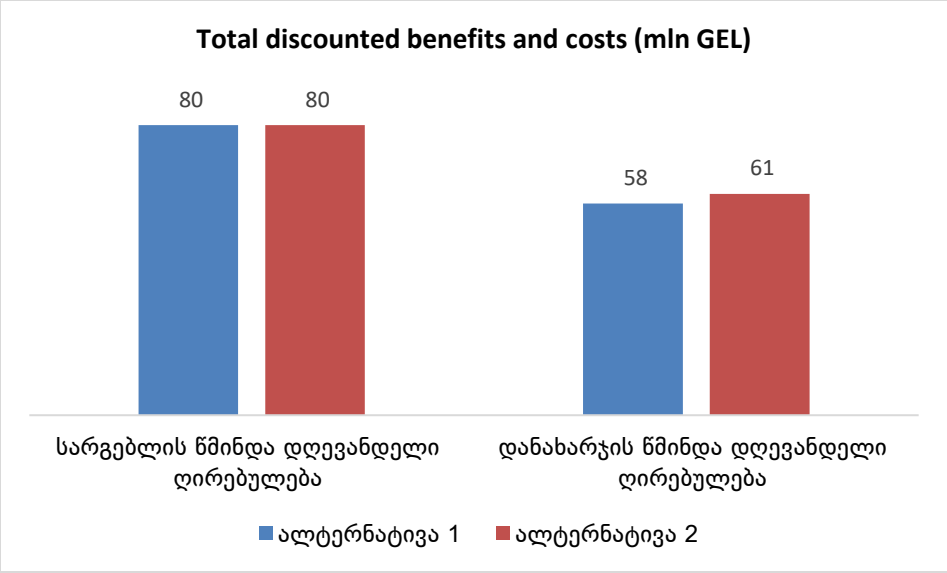


Diagram 4. Comparison of the discounted net benefit value by stakeholder groups

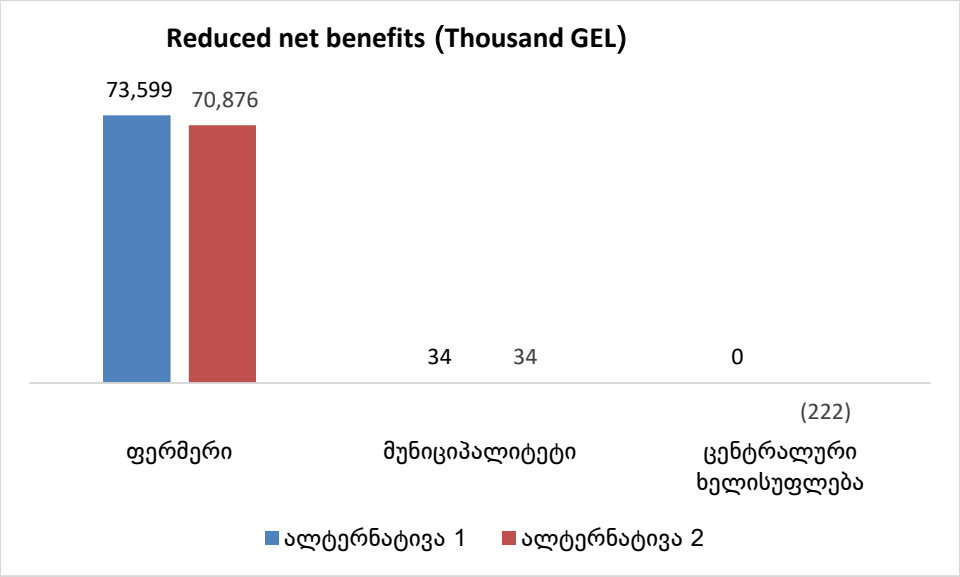


Diagram 5. Discounted net benefits for farmers, by years

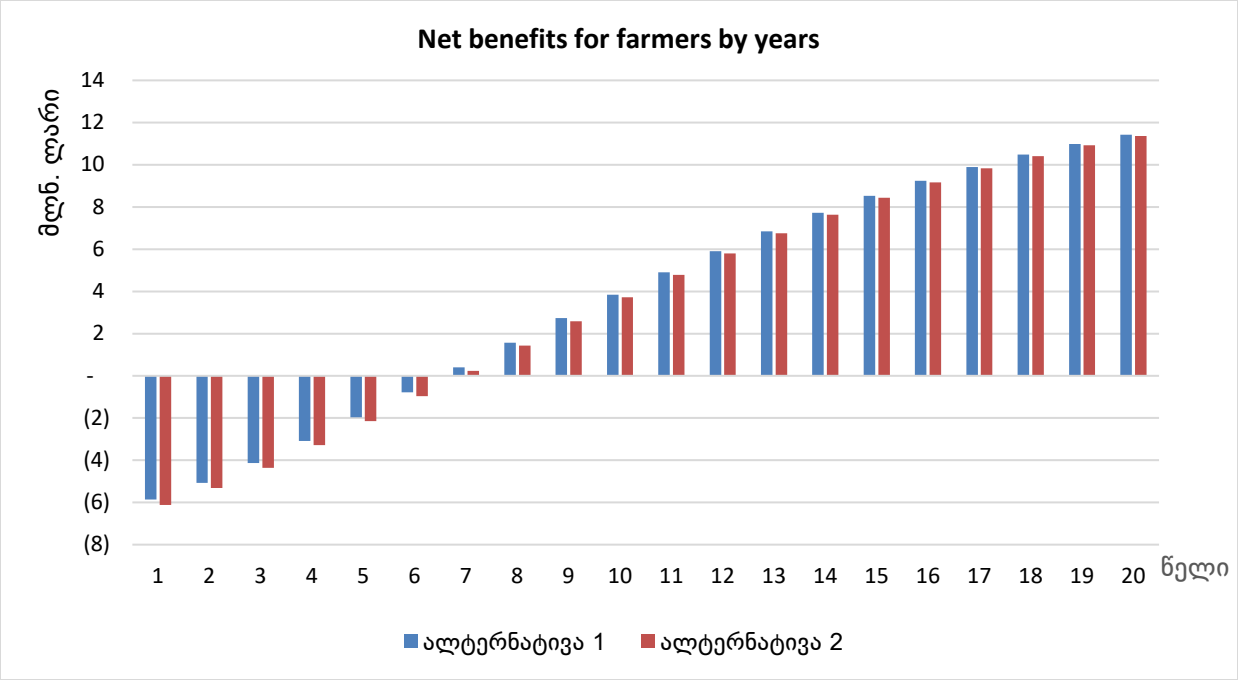


Diagram 6. Discounted net benefits for municipalities by years

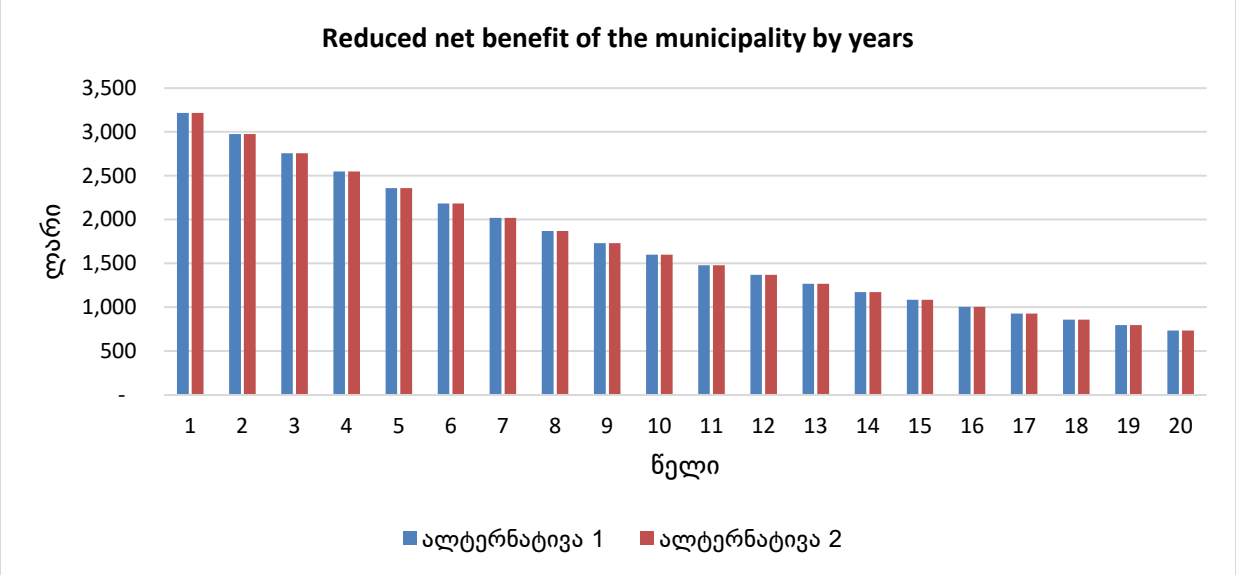
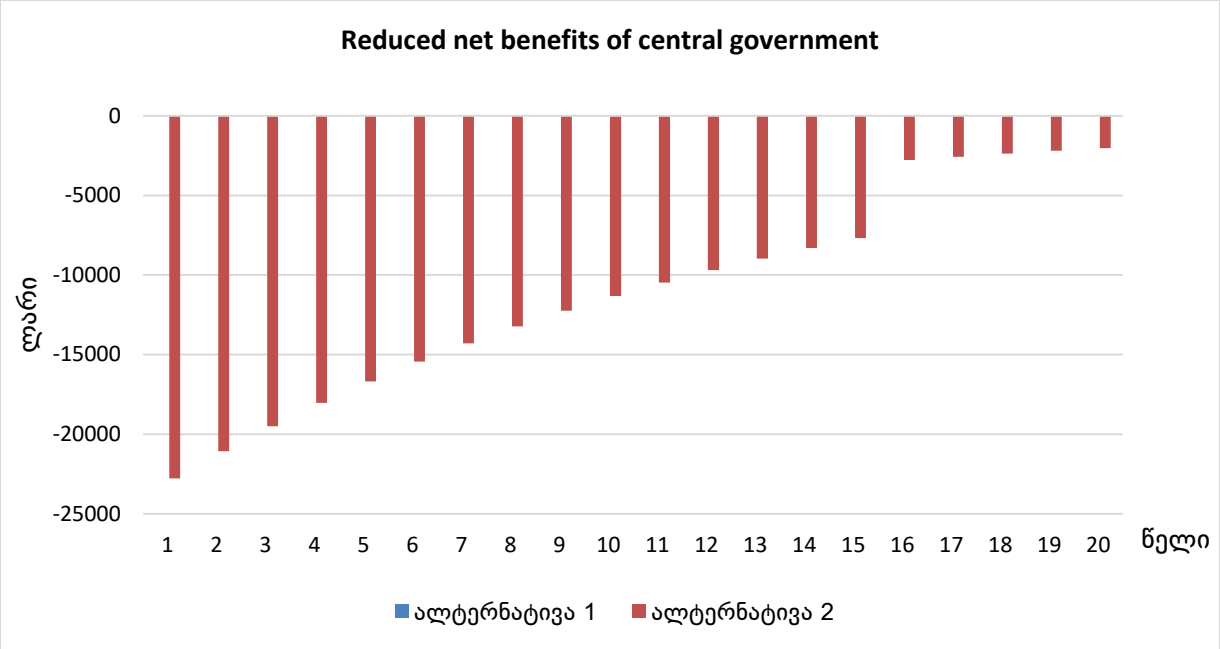


Diagram 7. Discounted net benefit value for central authorities by years



6.5. Sensitivity Analyses

A sensitivity analysis was performed in order to ascertain the robustness of the cost-benefit analysis results. In the framework of the sensitivity analysis, the following parameters have been changed:

- Application of high and low interest rates;
- Considering not 10% of the total cost for measures against degradation but 15% and 20%;

Changes of the parameters described above are shown in Table 20 below:

Table 20. Discounted value of net benefit in case of different benefit rate

Benefit rate	Reduced net benefits (Alternative 1)	Reduced net benefits (Alternative 2)
0.1223	7,693,063 GEL	5,652,260 GEL
0.0390	46,267,817 GEL	42,872,410 GEL

The results in this case do not change significantly. The present net value is positive at high rates too even for both alternatives.

- Not 10% of the total cost of the degradation measures is considered in the analysis, but 15% and 20% (Table 21)

Table 21. Discounted value of net benefit in case of changed costs

Additional cost	Reduced net benefits (Alternative 1)	Reduced net benefits (Alternative 2)
15%	(7,633,669) GEL	(10,219,456) GEL
20%	(36,853,698) GEL	(39,439,484) GEL

The results change in this case and the reduced net value is negative, which means that the monetary cost of the alternative exceeds its monetary benefit. This kind of outcome is expected when considering environmental regulations.

7. Multi-Criteria Analyses

The options are compared based on a set of criteria developed by the research team, in accordance with the objectives of the reform:

1. Rational use and protection of soil;
2. Rehabilitation of land/soil on degraded areas;
3. Increased agricultural production;
4. Feasibility;
5. Mitigated conflicts of interests;
6. Minimization of risks;
8. Coordination between the managing bodies;
9. Availability of implementation tools - leveraging the managing bodies to enforce the law.

Table 22 summarizes the results of the multi-criteria analysis. Plus (+), minus (-) and zero (0) are used for ranking the three options, where a plus (+) is used when there is a synergy between a criterion and the option's impact; a minus (-) when there is trade-off between the criterion and the impact; and if there is no impact at all, zero (0) is used.

Table 22. Multi-Criteria Analysis

Evaluation Criteria	Option 0. Baseline Scenario	Option 1	Option 2
NPV of net benefit (GEL)	n/a	21,586,359 GEL	19,000,573 GEL
Rational use and protection of soil	-	+	++
Rehabilitation of degraded areas	-	+	+
Increased agricultural production	-	+	+
Feasibility	0	++	+
Mitigated conflicts of interests	0	++	+
Minimization of risks	-	+	++
Coordination between the managing bodies	-	+	++
Availability of implementation tools	0	+	++

The first and the second evaluation criteria - “rational use and protection of soil” and “rehabilitation of degraded areas” are the main objectives of the draft law. When comparing these options, Option 1 is the best because it ensures implementation of the goals set by the law.

As for “Increased agricultural production”, in this case option 1 is priority because in case of this option increase of productivity is expected.

With respect to the second and third criteria, both Options have the same evaluation, as in the analysis in both Options degraded areas are rehabilitated and productivity is increased. The benefits are the same for both Options, but in the case of Option 1, they are associated with a higher risk. In addition, since in Option 2 farmers are aware of the benefits of soil conservation, in the longer term, this Option can achieve higher benefits.

In terms of "feasibility", Option 1 is preferable as it does not require any restructuring and is decentralized without any systematic change.

In light of “conflict of interest” Option 1 is preferable because, unlike Option 2, farmers are required to carry out soil analysis.

In terms of "minimization of the risks", Option 2 is preferable because, as noted above, in the case of Option 1, the risk that the law will not be enforced is higher. Option 1 differs slightly from the status quo, where measures to prevent soil degradation are decentralized under very low or no control from state.

In light of 'coordination between governing bodies', Option 2 is most likely to meet this criterion because coordination through a separate structural unit / agency is simpler than through different stakeholders.

Option 2 has an advantage in terms of "implementation mechanisms", since prioritizing the issue of protecting the soil by a separate structural unit / agency and raising funds from the central budget is easier in this Option rather than in the case of individual stakeholders.

8. Monitoring and Evaluation Plan

In order to track progress and evaluate the impact of the law, it is important to monitor how the objective indicators change over time. The indicators are divided into five categories based on the type of result:

I. Indicators which reflect the availability of inputs to implement the draft law;
II. Activities needed to achieve the objectives of the law;
III. Outputs - direct, immediate results associated with implementation of the law;
IV. Outcome - the mid-term consequences;
V. Impact - the long-term results, associated with the general objectives of the draft law.

Table 23. Monitoring and Evaluation Plan

Indicator	Frequency	Responsible for Monitoring
Result I: Inputs		
• Budget allocation for implementation of soil protection measures (break-down by central and municipal budgets)	Annual	MEPA, MoF and Agrarian Issues Committee of the Parliement of Georgia
Result II: Activities		
Operational Objective 1. Define Legal Basis for Soil Protection		
• Law on Soil Protection subsidiary legislation are adopted	Once	MEPA and Agrarian Issues Committee
Operational Objective 2. Define legal basis for the execution of fines		
• Number of fines executed for various illegal activities	Annual	MEPA
Operational Objective 3. Awareness Raising on Soil Protection		
• Number of awareness raising campaigns conducted	Annual	MEPA
Result III: Outputs		
Result 1: Rehabilitation of Degraded Lands		
• Total rehabilitated area (ha)	Annual	MEPA
• Total cultivated area (ha)	Annual	GeoStat
Result 2: Ameliorated Areas		
• Total irrigated area (ha)	Annual	MEPA
• Total drained area (ha)	Annual	MEPA

Result 3: Rehabilitation/Development of Windbreaks		
• Total length of rehabilitated/ developed windbreaks (km)	Annual	MEPA
• Total area of rehabilitated/ developed windbreaks (km)	Annual	MEPA
Result IV: Outcome		
Result 1: Reduced Land Degradation		
• Indicator 1: Increase of land cover	Annual	MEPA
• Indicator 2: Increase of land productivity	Annual	MEPA
• Indicator 3: Increase the of organic carbon stock in soil	Annual	MEPA
• Indicator 4: Reduction of soil erosion	Annual	MEPA
• Indicator 5: Reduction of soil contamination with heavy metals	Annual	MEPA
Result V: Impact		
Specific Objective 1. Increase of Soil Fertility		
• Eroded agricultural land area (ha)	Annual	MEPA
Specific Objective 2. Increased Agricultural Production		
• Average productivity of crops (kg/ha)	Annual	GeoStat
General Objective 3. Increase of Biodiversity		
• Increase of the number of species	Annual	MEPA

9. Conclusions and Recommendations

The analysis shows that based on existing assumptions the monetary cost of the draft law outweighs its benefits when analyzed for 20 years. Negative NPV might be explained by the fact that it is impossible to monetarize all the benefits of soil degradation reduction.

The analysis shows that when the incremental cost is only 10% higher than the status quo cost on soil protection, the monetary benefit of the bill exceeds the cost. At higher costs, however, the cost outweighs the benefit and the reduced net benefit value is negative (Sensitivity Analysis, Table 21). The reduced net benefit can be explained by the fact that all the categories of benefits resulting from the reduction of soil degradation are not fully monetized in the cost-benefit analysis.

It is important to inform farmers about the benefits of soil protection and that the latter is directly linked to the ability to increase the income of agricultural farms / farmers. It is necessary to study the needs, challenges and goals of the rural population. Experience in many countries has shown that it often takes a long time to convince land users to implement improved (advanced) agricultural production practices.

It is important to consider that it is precisely local farmers who need to use conservation measures and that they must have appropriate knowledge, equipment, financial resources and willingness to use them. Practice has shown that encouraging and providing technical support to farmers is a far more successful approach for achieving land conservation than taking administrative measures.

Based on the experience of different countries, the following incentives can be highlighted:

- Providing equipment to farmers who will carry out soil conservation measures.
- Farmers who agree to carry out soil conservation measures are given priority in getting grants from state-run agrivultural programs/co-financing programs (e.g, “Plant the Future”, “Cheap Credit”, etc).

There is also a very important issue that is likely to have a major impact on the enforcement of the draft law - namely, the problem of land title registration for agricultural lands at country level and large number of unregistered agricultural plots. To address this challenge, it is recommended to further prioritize systematic land registration.

For the successful implementation of the draft law, it is very important to address problems related to leasing of state-owned land. In many cases the lessees does not feel obliged to take care of land which is not private property. In case of a lease, it is recommended that the relationship between the leaser and the leassee be regulated by law. For example, in Uruguay, the cost of conservation work carried out by the lessees has to be paid by the leaser after the lease expires. In turn, a lessee who refuses to pursue conservation practices may be penalized in accordance with law.

In order to effectively enforce the draft law, it is also important to collect data on soil and create a unified database. For this purpose, it is recommended to introduce modern technologies such as Geographic Information System (GIS) - GIS is used to evaluate soil types and determine their spatial distribution. This system is distinguished by the accuracy and cost-effectiveness of the evaluation, which will make enforcement more effective [16].

During the enforcement of the draft law, it is important to take into consideration promotion of environmentaly-friendly, sustainable and intensive agricultural production. The latter implies increased productivity in agriculture without adverse environmental impacts [17]. Sustainable agri-ecosystem has a positive impact on natural, social and human capital. Unsustainable systems reduce assets and their future value. Sustainable use of natural resources, including soil, is a necessary precondition for development of whole agricultural sector.

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Annexes

Table A 1. List of Respondents, Interview Dates and Main Findings

Interview Date	Respondent	Organization	Occupation of the Respondent	Main Findings
June 25	Gizo Tchelidze, Mr.	MEPA	Head of the Hydro-melioration and Land Management Department	Gizo Chelidze talked about the condition of soils in Georgia and the causes of soil degradation. He outlined the factors that cause soil degradation and discussed ways to solve them. According to him Complex and systematic planning is required. Improving the irrigation system and increasing the areas of water supply are also important for improving the soil. In order to improve soil condition, it is important to improve agricultural practices. There is a wrong practice of irrigation in Georgia, which causes soil salinization. Therefore, it is important to implement proper irrigation practices and rational use of water. The second important factor is the rational and proper use of pesticides, herbicides and other Chemicals. Gizo Chelidze emphasized the need for targeted use of land, its categorization and identification of relevant crops.
June 4	Ekaterine Sanadze, Ms.	MEPA	Head of Land Use Office, Hydro-melioration and Land Management Department	Ekaterine Sanadze talked about the importance of soil protection: soil protection not only has economic benefits in terms of crop yield, but it also affects biodiversity and human health. She also emphasized the necessity of adopting the draft law: in the old laws the obligations of the landowner were vague and often impossible to fulfill (for example, the Minister had to report to the government every year on soil quality). Also, there is no unified monitoring system. In addition, soil exports are not regulated and large quantities of soil are exported overseas. Ekaterine Sanadze also talked about the necessity of passporting the soil. At this stage, the state is unable to do it because of following reasons: • Large amounts of land are unregistered • Lack of large, properly equipped laboratories. There is a shortage of specialists. Passportization is needed not only by soil scientists but also by genesis specialists.

June 4	Alverd Chankseliani, Mr.	MEPA	Head of Waste and Chemicals Management	Alverd Chankselian spoke about the importance of inventorying, estimating and accounting for contaminated soils. These processes require financial resources. The issue of land ownership is critical. In some cases, the contaminated area is privately owned, and the state has no right to conduct research or any activities on privately owned contaminated land unless the contamination is of a large scale and the population itself does not request the measures. Mr. Alverd Chankseliani believes that the law on soil protection is necessary. He also believes that the issue of removing the fertile soil layer should be regulated.
June 7	Natia Iordanishvili, Ms.	National Forestry Agency	Deputy Head of National Forestry Agency	Natia Jordanishvili talked about the activities carried out in the field of soil protection. In Borjomi Forest Park, soil erosion measures were made, barriers were erected along the slope, and naturally planted with trees and shrubs. Elsewhere, no such measures were taken. According to Natia Jordanishvili, first of all, inventory should be conducted in order to identify critical areas. Forest inventory is not available any time soon. Last inventory was conducted in 1997. Another Inventory started in 2013 and covered only 3,000 acres. Natia Jordanishvili talked about the forest restoration works, which are carried out in two directions: 1. Planting and sowing; 2. Promoting natural renewal. She also outlined Georgia's commitment to climate change.
June 11	Marina Ghvinepadze, Ms.	National Food Agency	Expert	Marina Ghvinefadze talked about the need to collect detailed statistics on pesticide and fertilizer use. Today only Geostat processes the data. National Food Agency has information on the amount of pesticides and fertilizers coming into the country from the customs authorities. Marina Ghvinefadze noted that too many countries require information on pesticides and fertilizers used on exported soil. She noted that it is impossible for all farmers to use pesticides and fertilizers.
June 26	Neli Korkotadze, Ms.	MEPA	Department of Environmental Supervision	Neli Korkotadze talked about the issues related to soil management and noted that today there is no authorized body where it can be procured legally. She also spoke about the procedural issues and difficulties associated with oversight, especially in the case of private ownership of farms and land.

June 21	Temur Revishvili, Mr. & Vakhtang Goliadze, Mr.	Anaseuli Laboratory	Director of Anaseuli Laboratory Anaseuli Laboratory	Temur Revishvili and Vakhtang Goliadze described the current condition of soils and noted that the draft law addresses the existing challenges. They noted that while enforcing the draft law, the problem would be a lack of awareness among the population of the highlands in terms of the management of erosion processes. Causes of soil degradation were highlighted by poor soil treatment, natural cataclysms, abundant rainfall and droughts. Temur Revishvili and Vakhtang Goliadze prepared a description of soil degradation measures and their associated costs for the Guria region.
June 11	Besik Kalandadze, Mr.	Tbilisi State University	Soil Geography Associated Professor, Department of Geography, Faculty of Exact and Natural Sciences,	Besik Kalandadze talked about the costs associated with the implementation of environmental measures in general and the importance of preventive measures. He noted that there is no information on soil degradation rates and it is necessary to start this process. He also talked about the need for the involvement of scientists and experts.
June 28	Karlo Amirgulashvili, Mr.	MEPA	Head of Biodiversity and Forest Department	Karlo Amirgulashvili talked about bioremediation, which assists in biological processes of soil recovery and emergence. These are quite expensive measures, but they are essential for the conservation and preservation of both soil and forest biodiversity. He identified the problem of grazing management both in the forest and outside. It is not yet clear how many souls per hectare of cattle are to be hunted (unless we count the figures in the old Soviet books, which we cannot rely on now). However, in some places, grazing and overgrazing on the contrary is good and helps to maintain the soil. But if it starts to sink and leads to soil erosion, it will cause soil degradation. This problem is especially acute in eastern Georgia.
June 6	Marina Shvangiradze, Ms.	Expert	Expert	Marina Shvangiradze talked about soil degradation as a part of the land. In Georgia, land degradation is big problem, but soil degradation is relatively low. Since the state does not have the proper financial resources, it is important to identify which areas are the priority. If erosion occurs in the mountains where no one lives, then this place may not be a priority and preferences in places where degradation impedes human existence and activity: • Each type of erosion should be characterized by appropriate indicators; • Soil exports should be regulated; • The issue of fertile layer reclamation and storage should be regulated;

				• Mineral extraction issues should be regulated. Marina Shvangiradze talked about the use of soil removed during construction or extraction (eg, to strengthen the riverbed).
June 5	Nodar Khatiashvili, Mr.	Scientific-Research Centre of Agriculture	Deputy Director of Scientific-Research Centre of Agriculture	Nodar Khatiashvili talked about the issues related to the draft law and pointed out articles that are vague and need some other formulation. Listed issues that require clarification. He emphasized the absence of a law enforcement mechanism and noted that issues related to monitoring and enforcement should be clearly stated. It is unclear how the farmer will be obliged to check the quality of the soil and provide information to the relevant authorities.
June 5	Giorgi Ghambashidze, Mr.	Scientific-Research Centre of Agriculture	Hear of Laboratory	During the meeting Giorgi Gambashidze noted that there is no complete information on the erosion of the Georgian soil, especially about the hot spots. At last, erosion information dates back to 1989, and the situation has worsened since then. There is no information on what crops are grown and what pesticides farmers use. As for pasture management, the situation is even more uncertain.
June 6	Elene Bakradze, Ms.	National Environmental Agency	Head of Ambient Air, Water and Soil Analysis Laboratory	Elene Bakradze noted that the National Environmental Agency is working on heavy metal contamination issues and inspecting places (playgrounds, squares, parks) where heavy metal pollution can cause great harm to the population. In addition, the agency checks the locations where extraction is carried out, as extraction is one of the sources of such pollution.
June 15	Natia Kobakhidze, Ms.	GIZ	Chief Advisor of Integrated Biodiversity Management South Caucasus Project	Natia Kobakhidze talked about pilot projects that GIZ has implemented to reduce soil erosion: Sustainable grazing management (Shenako, Tusheti) - and integrated erosion control (Jvarboseli, Tusheti).
June 6	Ana Rukhadze, Ms.	Expert	Expert	Ana Rukhadze talked about the problem of wetlands, which is a natural process and does not belong to soil erosion species.
June 19	Ketevan Tsereteli, Ms.	REC Caucasus	Project Manager	Katie Tsereteli spoke about a pilot project funded by IFAD, which deals with the cultivation of windbreaks in different regions of Georgia. Wind erosion is particularly widespread in eastern Georgia and is one of the most common types of soil degradation in Georgia.

June 20	Maka Zumbulidze, Ms.	REC Caucasus	GIS Expert	Maka Zumbulidze talked about the KfW project, which resulted in agricultural land being privatized and mapping of soil degradation species. This information and maps about bonitization became the basis for a quantitative analysis of the study.
June 25	Irakli Moistsrapishvili, Mr. Guram Kupatadze, Mr. Akaki Glonti, Mr.	FERRERO (Samegrelo Region) Civil Society Organization "Municipal Center for Civic and Aesthetic Education" Agricultural Division of Ozurgeti Municipality (Guria Region)	Expert Representative Chief Specialist	Representatives of Samegrelo, Imereti and Guria generally discussed the situation of soil degradation in the regions and challenges in the field of agriculture.
June 27	Nikoloz Kiknavelidze, Mr.	Regional Agricultural Office (ROA) of Mtskheta-Mtianeti	Head	Nikoloz Kiknavelidze highlighted main Problems of Mtskheta-Mtianeti Region: • Land Cadastre and Passportization: • Grazing, in particular the absence of winter pastures and the use of private spaces. Mostly damaged in the region: corn, barley, oats, wheat, vegetables, cabbage It reduces crop yields by about 20%, and loss of the farmers is 30%.
June 27	Mamuka Lomsadze, Mr.	Regional Agricultural Office (ROA) of Shida Kartli	Head	Mamuka Lomsadze talked about soil erosion spread in Shida Kartli region: • Wind erosion; • salinization; • floods - Liakhvi and Mejuda rivers; • Soil contamination with polyethylene / mulch tape He singled out development of windbreaks and dams from soil protection measures, but noted that costs were high. He also noted that it may ban the setting up of a secondary processing plant.
July 2	Zurab Chikhladze, Mr.	Rural Development Department of Autonomous Republic of Adjara	Head	Zurab Chikhladze informed the RIA team about the soil condition in the Autonomous Republic of Adjara. Adjara soils have been subject to intense agricultural impacts for a long period of time, thus dramatically altering their quality. Most of the soils have suffered degradation due to reduced nutrients, deterioration of fertility, degradation of structure, decrease in humus and exchange contents.

	Ana Kanteladze, Ms. Besik Gotsiridze, Mr.	Regional Agricultural Office (ROA) of Racha-Lechkhumi-Kvemo-Svaneti Regional Agricultural Office (ROA) of Racha-Lechkhumi-Kvemo-Svaneti	Head Specialist	Besik Gotsiridze talked about soil erosion problems in Racha-Lechkhumi and Kvemo Svaneti region: • There is widespread water erosion in the region caused by mudslides; • Excessive grazing, illegal logging and improper handling of slopes are major causes of soil erosion; • The area of erosion about 10-15%; • Soil erosion protection measures are not implemented in the region, there is no proper body and structure to implement these measures; • Water erosion mainly affects pastures. The crops in the region are: grapes, corn and beans, but mostly not.
July 5	Manana Kevlishvili, Ms.	Telavi State University (Kakheti Region)	Dean of Faculty of Agriculture	Manana Kevlishvili talked about soil erosion spread in Kakheti region: • There is wind erosion in Dedoplistskaro municipality; • Water erosion, mudflows occur on the slopes of Tsiv Gombori and damages the lands of Telavi, Akhmeta and Gurjaani municipalities. Kvareli, Lagodekhi less. In general, there are different soils on the left and right sides of Alazani. • The reason for the decrease in soil fertility is due to improper practices: insufficient amount of fertilizer deposited or incorrect fertilization; • Insufficient amount of fertilizers are used due to lack of knowledge. According to Manana Kevlishvili, dams are being built for mudflats in the Kakheti region to combat degradation. Also, specialists are hired in agricultural service centers or retraining existing staff.
July 10	Iago Kochiashvili, Mr.	Representative of MEPA in Dedoplistskaro	Representative in Dedoplistskaro	Iago Kochiashvili described the situation in Dedoplistskaro municipality in detail, where the issue of wind erosion is very acute. The lack of windbreaks in the municipality is the first problem. He noted that awareness of the farmers should be increased. As for the overgrazing issue, he mentioned that farmers should be encouraged.

Table A 2. Soil Degradation in Details (According to MEPA)

List of Measures	Description of the Measure	Average Cost of the Measure (GEL/Ha)	Frequency of Measure
Liming	3-5 ton lime is applied on 1 ha; Total cost is 3000 GEL/ha (lime - 2500 GEL and 500 GEL its disposal).	3000	Once every 10-12 years
Application of organic fertilizer	Approximate cost of manure for 1 ha 2100 GEL. On average, 30 t is applied on 1 ha. The price of 5 t (1 car) is 350 GEL.	2100	Once every 3-5 years, 10% of initial price
Crop rotation	Alfalfa is used for crop rotation, in non-irrigated areas sainfoin. Alfalfa is planted 25kg/ha; 1kg – 20 GEL; in total 500 GEL/ha. Sainfoin is planted 100kh/ha; 1kg – 6 GEL; In total 600 GEL.	550	Alfalfa – in 5 year crop rotation every 8th year; Sainfoin - in 5 year crop rotation every 7th year.
Mulching	It is important under which culture is mulching conducted, in case of strawberries mulching is made with a special textile and costs 1 sq. m - 1 GEL, respectively - 1 ha/7000 GEL; In case of polyethylene mulching - 1 ha / 5000 GEL; As for vineyard stubble mulching, 1600 blocks of stubble on 1 ha; average price for one block is 3 GEL; in total 4800 GEL/ha.	5600	Every 4th year in the case of special textiles; Every year in case of polyethylene; Every 5th year in the case of stubble.

Application of Nitrogen, Phosphorus and Potassium fertilizers (NPK)	300 kg of NPK is used per ha on average. The average price of 1 kg is 1.3 GEL. Total average price of NPK per hectare is 390 GEL.	4800	Once every 3-5 years
Seeding	Both legumes and other crops can be used for seeding. 250 kg of pea is sown per ha, 1 kg costs 3 GEL, accordingly 250 kg will cost 750 GEL. 100 kg of sainfoin is sown on one ha, price of 1 kg is 6 GEL, in total 600 GEL per ha. As for clover, 16 kg is sown per ha, 1kg costs 25 GEL, 400 GEL per ha. In the case of oats - 250 kg /ha; 1 kg - 1.5 GEL; 345 GEL / ha; Buckwheat - 60 kg /ha; price per kg - 2.50 GEL; 150 GEL/ha.	450	Every 8th, 9th year
Composting	It is made from all the organic waste accumulated on the farm, plus cooking waste. It is very good to add manure. Absolutely balanced organic fertilizer: construction of 4 aq. m. simple composting facility with wire mesh costs 130 GEL.	130	Every 4th year
Chemical Ameliorative Measures (Application of gypsum and washing out)	Application of gypsum (belongs to chemical ameliorative measures since salts are removed from soil through application of chemical ameliorant – gypsum).	3129	Application of gypsum once in 5 years and inspection is required every 3rd years.
Agro-Biological Method and Agro-Technical Measures	Agro-Biological Method, which implied planting “salt-loving” plants, including agricultural crops that over time will free the soil from salts.	4800	Once in 5 years

Drainage Ditches	The required materials and labor costs are 15,000 GEL/ha on average.	15000	Depends on operation type
Windbreak Development	On average, 2518 trees are planted on 1 ha, 1 seedling average price is 3 GEL The cost of seedlings for 1 ha amounts to 7554 GEL; Field works (making pits, mowing, digging) cost is 4786 GEL/ha; In total 12340 GEL/ha.	12340	Depends on seedling species