Ecosystem Service Valuation and Cost-Benefit Analysis of Investment in Georgian Protected Areas

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Date of submission: April 2023

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ACKNOWLEDGEMENTS

Funding for this project was provided by UNDP/GEF with co-financing from Caucasus Nature Fund (CNF) and is gratefully acknowledged along with inputs from Irakli Goradze and his colleagues at the UNDP. The CNF provided co-ordination and technical assistance and our thanks goes in particular to Tamar Pataridze and Lika Kalmakhelidze for their assistance.

Many people working in the Georgian conservation and other sectors contributed support, information, time and useful comments or inputs and deserve thanks. They include representatives of Agency of Protected Areas (APA) along with its staff of 21 Territorial Administrations and representatives of Tusheti, Aragvi and Truso Protected Landscape Administrations.

A special thanks is due to Zviad Tiginashvili, Givi Vachnadze, Diuli Tsereteli and Besarion Aptsiauri, who provided estimates of biomass carbon stock per hectare for deciduous and coniferous forests in Georgia.

Finally, others that gave of their time for interviews and/or provided information are acknowledged.

Any views and opinions expressed in this report are nevertheless those of the authors and do not necessarily reflect those of contributors.

Suggested citation: Van Zyl, H.W., Kakabadze, E. and Goduadze, I. 2023. Ecosystem Services Assessment and Cost-benefit Analysis of Investment in Georgian Protected Areas. Report to Caucasus Nature Fund and the Georgian Agency of Protected Areas forming part of the GEF/UNDP project “Enhancing financial sustainability of the Protected Areas system in Georgia. CNF, Georgia.

EXECUTIVE SUMMARY

Georgia lies within the globally recognised Caucasus Biodiversity Hot Spot and is home to a rich diversity of plant and animal species, many of which rely on the protected areas (PAs) network for their continued survival. PAs also provide public goods and ecosystem services which support livelihoods especially in rural areas and make a significant contribution to key sectors including tourism, agriculture, water supply and energy whilst assisting with climate change mitigation and adaptation.

Despite significant progress, the PA network has not reached its full potential in terms of biodiversity conservation, opportunities for surrounding communities and achieving overall socio-economic development goals. In part, this can be linked to a lack of funding for PA management which has been shown to be inadequate even before the COVID-19 pandemic.

The objective of this assessment is to make the economic case for increased funding of PAs by government and other sources whilst also raising general awareness about their value and contribution to key economic sectors and wider society. It profiles the PA system and estimates the current baseline values or benefits of the ecosystem services that are provided by PAs. It then conducts a cost-benefit analysis of increased investment in PA management, outlines the sectoral and other policy alignment benefits of investment in PA management and highlights PA management authority achievements in become more financially self-reliant.

The Protected Areas system and its management

In 2022, when this study was undertaken, the PA system in Georgia consisted of 94 PAs (14 Strict Nature Reserves, 13 National Parks, 40 Natural Monuments, 24 Managed Reserves and 3 Protected Landscapes) covering about 11.42% (796,187 ha) of the country's territory.

Planning for the PA system is carried out by the Ministry of Environment Protection and Agriculture (MEPA) of Georgia, the Agency of Protected Areas (APA) (a legal entity of public law under the Ministry) and the Ministry of Regional Development and Infrastructure of Georgia. Key decisions on the designation, expansion, upgrading or downgrading of PA categories are made by the Georgian Parliament based on the Ministry’s recommendations.

The Agency of Protected Areas (APA) manages most PAs through 21 Territorial Administrations. Protected Landscapes are managed by the management units established under corresponding Municipalities where they are located. Approximately 600 permanent and 150 part-time contracted staff carry out PA management with the majority (95%) employed by APA and the remainder by the Protected Landscapes management authorities.

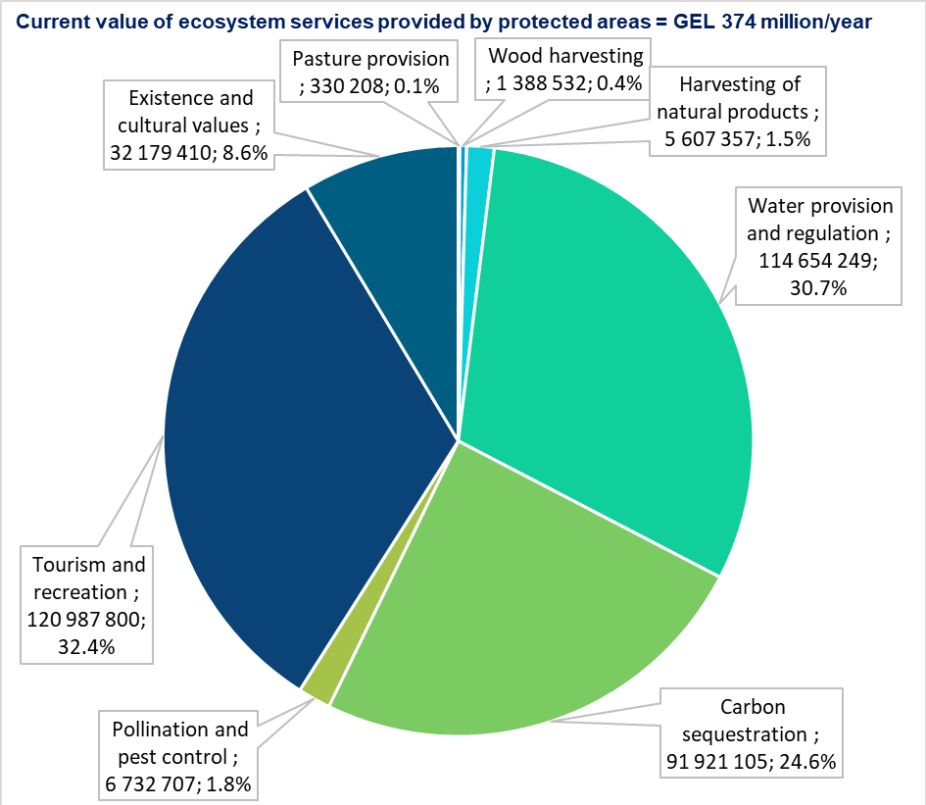
APA receives funding from state budget allocations, own revenues, grants mostly from donors and limited special purpose funding. The main funding sources for the Protected Landscapes are similar to those of APA with local government budgets allocations as the main source of funding.

Current baseline ecosystem services values associated with PAs

The total value of the key ecosystem services currently provided by PAs in Georgia was at least GEL 374 million per year with tourism and recreation, water provision and

regulation and carbon sequestration being the relatively more prominent services (see Figure 1).

Figure 1: Minimum annual ecosystem services values associated with protected areas in Georgia in GEL and showing percentage contributions (2022)



These baseline values were derived from a mix of local primary data and secondary data from Georgian and international sources. Key findings with respect to individual ecosystem service provided by PAs were as follows:

- Livestock rearing plays an important role in Georgia's rural economy. **Pasture areas inside PAs** are therefore a valued asset and are found in a selection of PAs including Borjomi-Kharagauli, Tusheti, Vashlovani and Javakheti. The rental values of pasture areas covering 65,000 ha were used to conservatively estimate a GEL 850,000/yr baseline value of the pasture services provided by PAs. This value applies to land where rental fees are paid plus traditional pasture areas that attract no fee but nevertheless provide valuable pasture services.
- **Wood harvesting** takes place in numerous PAs guided partly by forest management plans which specify harvest amounts and locations that are sustainable and compatible with biodiversity conservation goals. Approximately 15,500 m^3 of wood was harvested from within PAs in 2021 with a market value of GEL 1.4 million. More than half of this value comes from Borjomi-Kharagauli National Park.
- Collection and **harvesting of non-timber forest products (NTFPs)** plays an important role in supporting rural community livelihoods and is allowed in the Traditional Use Zones of 26 PAs. The main products harvested are hay, mushrooms, berries, fruits, nuts, medicinal plants, other herbs, ornamental plants, honey, and fish. In total, roughly 4,583 households are involved in

harvesting of all types of the NTFPs which have a combined market value of about GEL 5.6 million/yr.

- The natural or near-natural habitats generally associated with protected areas result in natural water flows which ensure low levels of erosion, sedimentation and better water quality. They also regulate or smooth out flows reducing peak flows associated with higher flood risks while increasing low flows thereby ensuring greater water supply especially during dry seasons. There are several examples of the value of Georgian protected areas in **water provision and regulation**. Although hydropower plants are located outside PAs, many of hydro power plants benefit from water resources, originated in and around PAs such as the Tusheti, Machakhela and Kintrishi PAs. Protected areas such as Mtirala NP are a key source of water for Batumi and other villages nearby. The spring mineral water coming from Borjomi-Kharagauli NP has been the key source for IDS Borjomi Georgia mineral water company which has an annual turnover value in excess of US$ 26 million in 2021. The rivers and streams originating in protected areas also supply agriculture and support fish farming. The above indicators of importance and selected published sources were used to generate a total baseline value estimate for water provision and regulation services of GEL 114 million/yr.

- Georgia is vulnerable to **natural disasters** and well managed protected areas with their natural ecosystems can mitigate their impacts. For example, intact forests can control avalanches, landslides and prevent soil erosions, floodplains and wetlands provide space for floodwater and help to absorb it, natural vegetation in arid areas can prevent desertification, intact forest ecosystems are more resistant to fires. In terms of quantification, Brander et al. (2016) estimated the impact of forests on damage costs avoided from landslides in Adjaran forests. They found that, by 2035, a forest Restoration Scenario would gradually be associated with US$ 772,000/yr more damage costs avoided relative to a Degradation Scenario. Roughly 20% of this improvement can be ascribed to Adjaran forest areas inside PAs (Kintrishi PAs, Mtirala NP, Machakhela NP).

- The important role of healthy natural ecosystems, such as those in Georgian protected areas, in sequestering carbon and regulating the global climate has been widely recognised. Current total biomass carbon stocks in protected areas were estimated to be in the order of 23 million tC with much of this contained in extensive forests. The **annual carbon sequestration value** of protected areas was estimated at approximately GEL 92 million/yr using a relatively conservative average between the price of carbon offsets and carbon emissions damage costs.

- The agricultural sector in Georgia depends on **pollination services** of insects to produce food. Although far more research is needed in Georgia, the wild bees and other insects, as well as honey bees in and around protected areas are by far the best way to pollinate fruits and crops in support zones and thus support agriculture. Indictors of local importance and selected published sources were used to generate a total baseline value estimate for pollination services of GEL 6.7 million/yr. PAs are also generally associated with maintaining a diversity of insects, birds and animals that assist with the natural control of pests.

- Throughout the world, attractive and well-managed protected areas make a significant contribution to economic development through **tourism**. Tourist visitor numbers to protected areas in Georgia were extremely robust between 2014 and 2019 increasing almost three-fold to 1.2 million visitors. This growth

was more than twice the overall growth in international visitors to Georgia emphasising the importance of PAs. Post-COVID, protected area visitor growth has remained elevated above overall visitor growth. The current value of tourism associated with the protected areas was found to be in the order of GEL 121 million/yr based on 2022 visitor numbers converted into visitor days (or parts thereof for short visits) and multiplied by average spend per visitor per day.

- The protected areas of Georgia play the leading role in preserving the rich biodiversity of the country. They protect many unique habitats and species, including endemic and threatened species which have existence value to people. Protected areas in Georgia also support and **maintain the historical heritage, architecture, culture, traditions, religion and knowledge of local people**. Archaeological monuments from the Neolitic, Bronze Age and Ancient period are found within and adjacent to many PAs. Most PAs include different historical-cultural sites such as fortresses, castles, churches, monasteries, historical settlement, tombs, sacred sties, etc. The combination of scenic mountain landscape and architecture make the cultural landscape of PAs such as Tusheti, Aragvi and Truso PLs unique and of immense value. The existence and cultural value or Georgian PAs are highly significant although not valued in monetary terms. Tentative and conservative estimates for existence values of GEL 32 million/yr were nevertheless included based on studies from other countries.

Cost-benefit analysis of increased investment in PA management

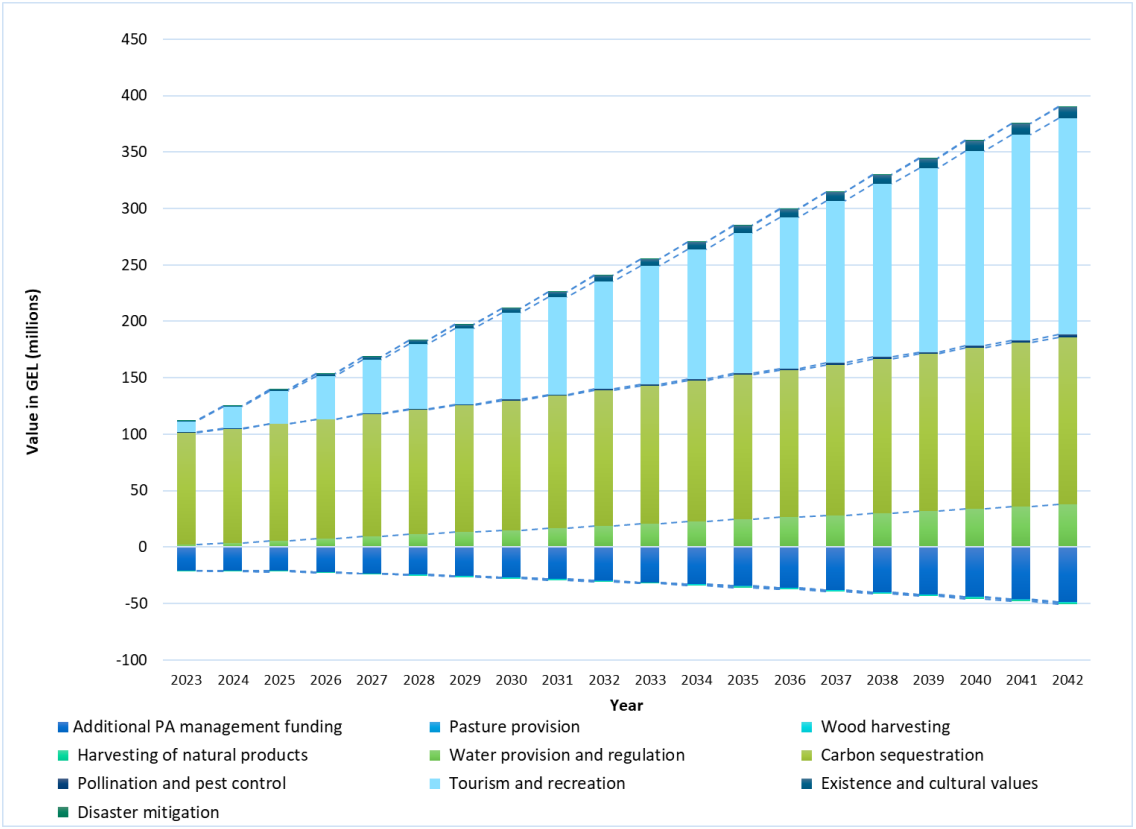
With the current baseline values associated with PAs established, an assesses of the likely future costs and benefits over the next 20 years of an Increased Funding Scenario versus the Business as Usual (BAU) Scenario was carried out.

The detail Finance Needs Assessment (FNA) carried out for the Georgian PA system estimated additional funding needs of GEL 16.6 million in 2021 for basic management which was 121% more than the funds available. This included increased general management costs, staff, equipment and modest infrastructure. These additional PA management funding need amounts, adjusted for inflation and real increases over the longer term, were included as costs in the cost-benefit equation.

For the benefit side of the equation, the focus was on projecting what additional funding is likely to mean for future ecosystem services values or benefits provided by PAs. This was a difficult exercise which relied on several assumptions linking increased funding to better management and future value changes.

Figure 2 shows the additional PA funding and the flow of ecosystem service values for the Increased Funding Scenario minus the ecosystem service values for the BAU Scenario (i.e. the net increase/decrease in ecosystem services values due to increased funding).

Figure 2: Costs and benefits over time under the Increased Funding Scenario relative to the BAU Funding Scenario (GEL 2022)



The NPV associated with the Increased Funding Scenario would be GEL 1.8 – 2.6 billion for the base case discount rate resulting in a Benefit: Cost Ratio of between 6: 1 and 9: 1 (Table 1). At an overall level, benefits would exceed costs by a substantial margin. Pasture use, wood harvesting and other harvesting values would be lower but sustainable. They would be exceeded by substantial increases in the value of all other ecosystem services. Increases in carbon sequestration along, tourism and recreation benefits and watershed services benefit would be particularly significant.

Table 1: Cost-benefit analysis results for Increased Funding relative to BAU Scenario

	Present Value (PV) in GEL millions at discount rate of:					
	4%			**6%**			**8%**		
Additional PA management funding									
Additional PA management funding	***325***	**-**	***488***	***267***	**-**	***400***	***222***	**-**	***333***
Ecosystem services value changes									
Pasture provision	-2	-	-3	-2	-	-2	-1	-	-2
Wood harvesting	-2	-	-4	-2	-	-3	-2	-	-2
Harvesting of natural products	-7	-	-10	-5	-	-8	-4	-	-6
Water provision and regulation	188	-	282	148	-	223	119	-	178
Disaster mitigation	3	-	4	2	-	3	2	-	3
Carbon sequestration	1 292	-	1 939	1 077	-	1 615	910	-	1 365
Pollination and pest control	11	-	17	9	-	13	7	-	11
Tourism and recreation	958	-	1 437	756	-	1 133	604	-	906
Existence and cultural values	52	-	78	41	-	61	33	-	49
Total	***2 493***	**-**	***3 740***	***2 024***	**-**	***3 036***	***1 668***	**-**	***2 501***
Net Present Value (NPV)	***2 168***	**-**	***3 252***	***1 757***	**-**	***2 636***	***1 446***	**-**	***2 168***
Benefit: Cost Ratio (BCR)	***6***	**-**	***9***	***6***	**-**	***9***	***6***	**-**	***9***

The results were subjected to a sensitivity analysis which showed that:

- Using higher or lower discount rates do not change the overall findings materially.
- Protected areas management costs would have to increase by several multiples and/or benefits would have to decrease by several multiples to change the overall net benefit outcomes.
- Carbon sequestration and tourism represent a significant proportion of benefits. Overall results would, however, remain positive even if carbon sequestration benefits or tourism benefits are assumed to be zero.

Although this assessment focused on existing PAs, overall positive results should also be expected for investment in the expansion of the PA network.

Alignment of investment in protected area management with policy and planning

The policy alignments achieved by increased PA funding are worth emphasising to support the results of the cost-benefit analysis. The need to increase funding is clear in policies, strategies and plans dealing with biodiversity and protected areas such as the Fourth National Environmental Action Programme 2022 – 2026 (NEAP - 4) and the 2022 Global Biodiversity Framework (GBF) which requires unprecedented investment in PA management and expansion. What should also be emphasized is that increased funding is aligned with:

- National socio-economic development policies including the Socio-Economic Development Strategy of Georgia, the National Document on Sustainable Development Goals and the EU-Georgian Association Agreement.
- Legal provisions and sector plans in water (including Planning of Water Protection Measures under the Georgian Law on Water), energy (including the State Policy in the Field of Energy of Georgia), agriculture and rural development (including the Agriculture and Rural Development Strategy and Action Plan) and tourism (including the Tourism Development Strategy of Georgia 2025).
- Climate change adaptation and mitigation as per Georgia's 2030 Climate Change Strategy and Action Plan, reduced desertification as per the Second National Action Programme (NAP) to Combat Desertification (2014-2022) and land restoration imperatives as per the Land Degradation Neutrality Target Setting Programme.

Growing protected area own revenues / increase financial self-reliance

APA's own revenues, which are dominated by tourism revenues, grew very strongly from GEL 1.32 million in 2014 to GEL 11.22 million in 2019. The Covid-19 pandemic then reduced own revenue by two thirds after which it gradually recovered and is projected to reach GEL 9.4 million (25% of total funding) by the end of 2022.

Protected area management authorities continue to actively look for ways to increase and diversify own revenues. They are assisted by their partners including through the GEF/UNDP Enhancing Financial Sustainability of the Protected Areas System in Georgia Project which included a Finance Opportunity Analysis to identify the most promising potential sources of increased revenue. Some of these are being investigated further with a view to piloting or implementation. In addition, feasibility studies for increased tourism income generation have been, or are being, conducted for several PAs. The private sector should further increase its important role in creating

businesses that rely on PAs and by funding conservation directly or indirectly, for example, through paying for ecosystem services and compensating for damages.

Continued own revenue growth, in partnership with the private sector and communities, should be achievable but only if there is funding support from government and donors. In keeping with basic business principles, it takes investment in facilities, infrastructure and management capacity in order to maintain and grow revenues (as the saying goes, 'it takes money to make money').

Improvements in own revenues should be welcomed. However, there is also likely to be a limit to the own revenue growth potential of PAs without compromising biodiversity conservation which remains their primary purpose. Indeed, the overwhelming majority of protected area management authorities worldwide achieve partial financial self-reliance. This should also not be surprising as it is generally only feasible to monetise some of the significant public goods that protected areas provide mostly in the form of various ecosystem services.

CONTENTS

ABBREVIATIONS

APA	*Agency for Protected Areas*
BAU	*Business as Usual*
CBA	*Cost-benefit Analysis*
CDM	*Clean Development Mechanism*
CNF	*Caucasus Nature Fund*
CISES	*Common International Classification of Ecosystem Services*
ES	*Ecosystem Service*
ESV	*Ecosystem Services Valuation*
FAO	*Food and Agricultural Organization*
GBF	*Global Biodiversity Framework*
GDP	*Gross Domestic Product*
GEF	*Global Environment Facility*
GEL	*Georgian Lari*
GHG	*Green House Gas*
GIS	*Geographic Information System*
GIZ	*Deutsche Gesellschaft für Internationale Zusammenarbeit*
IPCC	*International Panel on Climate Change*
IUCN	*International Union for Conservation of Nature*
MEA	*Millennium Ecosystem Assessment*
MEPA	*Ministry of Environment Protection and Agriculture of Georgia*
MR	*Managed Reserve*
NGO	*Non-Governmental Organisation*
NM	*Natural Monument*
NP	*National Park*
NPO	*Non-Profit Organisation*
NPV	*Net Present Value*
NR	*Nature Reserve*
NTFP	*Non-timber Forest Product*
PA	*Protected Area*
PES	*Payment for Environmental Services*
PL	*Protected Landscape*
SLM	*Sustainable Land Management Programme*
TEEB	*Economics of Ecosystems and Biodiversity*
TEV	*Total Economic Values*
UNDP	*United Nations Development Program*
UNEP	*United Nations Environment Program*
UNWTO	*United Nations World Tourism Organisation*
UNFCCC	*United Nations Framework Convention on Climate Change*
WTTC	*World Travel and Tourism Council*
WWF	*World Wide Fund for Nature*

1 INTRODUCTION

"The health of ecosystems on which we and all other species depend is deteriorating more rapidly than ever. We are eroding the very foundations of our economies, livelihoods, food security, health and quality of life worldwide. It is not too late to make a difference, but only if we start now at every level from local to global."

- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services Global Assessment 2019.

Georgia is a key country within the globally recognised Caucasus Biodiversity Hot Spot. It is home to a rich diversity of plant and animal species, many of which are endemic and rely on the protected areas (PAs) network for their continued survival. PAs not only protect species and preserve habitats, they also provide public goods and ecosystem services which support livelihoods especially in rural areas. They make a significant contribution to key sectors including tourism, agriculture and water supply whilst assisting with climate change mitigation and adaptation.

Despite significant progress, the PA network of Georgia operates below its potential in terms of biodiversity conservation, opportunities for surrounding communities and achieving overall socio-economic development goals. In part, this can be linked to funding for PA management which has been shown to be inadequate even before the COVID-19 pandemic. There is a lack of understanding and appreciation of the value of PAs and of the favourable returns from investment in PA management. The overall objective of this assessment is to make the (economic) case for increased funding of PAs by government and other sources whilst also raising general awareness about their value and contribution to society and various economic sectors through the numerous ecosystem services that they provide. The focus is on existing PAs although results would generally be applicable to investment in new PAs yet to be declared and needed to expand the PAs network.

2 APPROACH

Guided by its objectives, the assessment had the following primary components which are reflected in the structure of this report:

1. Profile the PA system and identify the key ecosystem services provided by PAs in it.[1]
2. Estimate the current baseline values or benefits of the ecosystem services that are provided by the PAs in monetary terms to the degree possible.
3. Conduct a cost-benefit analysis of increased investment in PA management.
4. Outline the sectoral and other policy alignment benefits of investment in PA management.
5. Summarize PA management authority achievements in growing their own revenues along with current and future initiatives that are aimed at growing own revenue further. Discuss the limits to own revenue generation.

[1] The study does not include Machakehla PL established in September 2022 and four PAs (Bichvinta-Miusera SNR, Pskhu-Gumista SNR, Ritsa SNR, Liakhvi SNR) located on the de-jure Georgian territory that is not under de-facto control of the state.

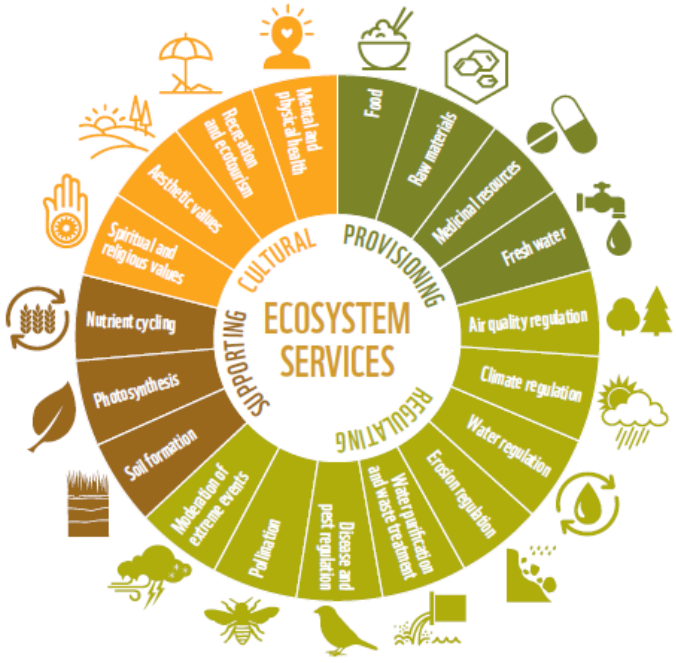
This section presents the key elements of the overall approach to the assessment. Finer points are then discussed further in the body of the report.

2.1 Identification of ecosystem services

To aid the identification of ecosystem services in the protected areas system, the conceptual frameworks and associated lists of ecosystems services contained in the Millennium Ecosystem Assessment (MEA), the Economics of Ecosystems and Biodiversity (TEEB) programme and the Common International Classification of Ecosystem Services (CISES) were used as a departure point. These are relatively similar frameworks and assist with the orderly classification and identification of ecosystem services. They are also structured in a way that is largely compatible with the Total Economic Value (TEV) framework developed by economists to guide valuation exercises.

Figure 2-1 below shows typical ecosystem service types which valuation essentially attempts to understand and quantify particularly in terms of their links to overall human well-being.

Figure 2-1: Ecosystem service categories and types



Source: WWF (2016)

The protected areas provides all the main ecosystem services that are commonly listed. This should not be surprising given the locations, sizes and varied habitats associated with PAs. Not all ecosystem services can be assessed making it important to identify key ecosystem services that are relatively more important and valuable discussed below.

Provisioning services / direct uses

Protected areas in Georgia are a significant source of provisioning services. Many of them are grazed and wood cutting and harvesting is carried out by both surrounding communities and, in some cases, by households living inside their boundaries. The following provisioning services were assessed:

- Pasture provision for livestock grazing

- Wood harvesting of firewood and timber
- Harvesting of natural product including non-timber forest products (NTFPs).

Regulating and supporting services

Regulating and supporting ecosystem services are generally classified as indirect use values (as opposed to direct uses such as harvesting). These services relate to ecological processes and, while their high importance is clear, it is often these types of services which are more easily ignored as they are less tangible and data on them is often limited. The following regulating and supporting services were assessed:

- Water provision and regulation
- Disaster regulation focused on landslides
- Carbon sequestration to mitigate against climate change
- Pollination and pest control

Cultural and amenity services

Ecosystem services broadly categorised as cultural and amenity services generally include those associated with recreation and tourism, aesthetic information, personal inspiration, spiritual and cultural experience/practice, education and human wellbeing and quality of life. The following services were prioritised for assessment:

- Tourism and recreational value
- Existence and cultural value

Accounting for the value of biodiversity

Note that the critical importance of biodiversity to all of these value streams needs to be recognised. However, in keeping with the approach in CSIR (2009), De Wit et al. (2009) and Getzner (2009), a value was not attached to biodiversity per se to avoid double counting. Instead, biodiversity was viewed as an important umbrella service that allows for the realisation of many other values which were quantified. For instance, biodiversity enhances pollination and pest control through its support of a greater variety of organisms and contributes to tourism value through the varied and more appealing environments associated with it.

2.2 Valuation techniques and data sources

Ecosystem services values were estimated in monetary terms to the degree possible and appropriate. This is in keeping with the recognised limitations of monetary valuation and best practice which is to work within the limitations of valuation (see, for example, the outputs of the TEEB programme on ecosystem and biodiversity values).

The overall approach to the valuation exercise was to combine (1) primary data gathering with (2) relevant findings regarding values derived elsewhere and to be found in the local and international valuation literature. Where possible and appropriate, local sources and values were used. Values from other countries were all converted to their equivalents in 2022 GEL using the unit value transfer technique with adjustments for exchange rate and income difference between countries (see Navrud, 2007). More details on the specific valuation techniques used for each service is also provided in the relevant valuation sections.

2.3 Future funding and management scenarios

Having established current ecosystem values, some broadly reasonable way was needed to predict likely PA value changes under enhanced funding and management. This was a challenging task given uncertainties and limited data. It was therefore necessary to construct future scenarios and make broad assumptions regarding reasonable changes in values under these scenarios. Two scenarios were assessed in this regard:

1. ***Business as Usual (BAU) Funding Scenario*** in which funding and management remains at current inadequate levels.

Versus

2. ***Increased Funding Scenario***, where funding increases and which should see the achievement of basic management goals.

Once additional funding needs were established, the focus of analysis shifted to projecting what this funding is likely to mean for each ecosystem services value stream. At the outset it needs to be recognised that this is a difficult exercise, which relies on several assumptions, linking increased funding to better management and value changes into the future. Value changes are therefore best viewed as approximate guides.

Degradation levels were used as a key informant of current and potential future values for ecosystem services. Note that, within the context of this study, degradation was used as a broad indicator of overall ecological quality encompassing level of vegetation coverage, ecosystem intactness, presence of key species of plants or animals, etc. Degradation may be caused by activities such as unsustainable farming practice, over grazing or harvesting which have direct value to local people. However, they often do not allow for the natural replenishment of land and associated ecosystem functions. This tends to result in negative impacts on regulating and supporting services in particular. For example, higher levels of degradation are associated with less vegetation cover, which results in lower levels of carbon sequestration and watershed protection.

Each protected area was assigned an overall degradation level for the current situation and for the two scenarios in 20 years' time. The levels were based on inputs from PA Administration staff and biodiversity experts done on a scale of 1 to 5, where 1 denotes low degradation and 5 denotes high degradation. The degradation levels used in the valuation process are shown in Appendix 1.

Additional specific assumptions for future scenarios for each PA are discussed in their separate sections.

2.4 Cost-benefit analysis

Cost-benefit analysis (CBA) is a widely used technique aimed at providing an indication of the economic efficiency and basic economic desirability of programmes or projects. For this study it was conducted for the Increased Funding Scenario relative to the BAU Funding Scenario.

Increased marginal funding needs were calculated based on funds needed minus those already allocated to PA management. Changes in benefit streams were also calculated relative to the outcomes projected for increased degradation under the BAU. This ensured that the benefits of increased funding included the avoided costs associated with further degradation and deforestation.

2.5 Assumptions and limitations

Key overall assumptions with relevance to the study included:

- All technical, financial, costing and other information provided by APA and other official sources is assumed to be correct unless a clear reason was found to suspect otherwise.
- The monetary quantification of ecosystem services was not possible, nor considered necessary, for each ecosystem service. Quantification focused on those services considered to be most important in the overall value of the protected areas system and that were amenable to quantification.
- An assessment of the opportunity costs of devoting land to protected areas relative to, for example, intensive cultivation was not part of the study scope.
- The findings of the assessment reflect the best professional assessment of the author drawing on relevant and available information within the constraints of time and resources thought appropriate and made available for the assessment.

Key overall limitations with relevance to the study included:

- The extent to which the environmental values could be assessed and quantified is to a large degree dependent on the information to be found for Georgia and in the international literature. Although the availability of information continues to improve, significant gaps remain which had a bearing on the level of detail and confidence that was possible in this assessment.
- While this applied study cannot be expected to address shortcomings or gaps in the theoretical literature, they have been considered to the extent possible in the choice of reasonable values.

3 THE PROTECTED AREAS SYSTEM AND ITS MANAGEMENT

Protected areas in Georgian are categorised as Strict Nature Reserves (SNRs), National Parks (NPs), Natural Monuments (NMs), Managed Reserves (MRs), Protected Landscapes (PLs) and Multiple Use Areas. In 2022, when this study was undertaken, there were 94 protected areas in Georgia (14 Strict Nature Reserves, 13 National Parks, 40 Natural Monuments, 24 Managed Reserves and 3 Protected Landscapes). PAs in each category have different levels of protection, primary purposes and allowable uses summarised in Table 3-1.

Table 3-1: Protected area categories, primary purposes as per law on PAs, typical sizes and allowable uses

PA category and number of PAs	Primary purpose	Typical size	Allowable uses
Strict/State Nature Reserve (IUCN category I) - 14	To preserve the dynamic and intact condition of nature, natural processes and genetic resources and for the purposes of carrying out scientific research, educational activities and environmental monitoring with insignificant impact.	Small to medium	Restricted access and uses. No grazing, wood and other sustainable harvesting, tourism and recreation.

National Park (IUCN category II) - 13	To protect relatively large ecosystems distinguished by natural beauty and having national and international importance, and to preserve the living environment and to carry out scientific research and educational and recreational activities.	Medium to large	Sustainable grazing, wood and other harvesting, tourism and recreation allowed in Traditional Use Zone and Visitors' zone correspondingly.
Natural Monument (IUCN category III) - 40	To protect relatively small unique natural territories and rare natural and natural-cultural formations of national importance.	Small	No grazing, wood and other sustainable harvesting. Tourism and recreation often encouraged.
Managed Reserve (IUCN category IV) - 24	To conserve natural conditions necessary for preserving wild species of living organisms, groups of species, biocoenosis and inorganic natural formations of national importance, which requires the implementation of special restoration and maintenance measures by humans. Individual renewable resources may be used under strict control in a managed reserve.	Small to medium	Sustainable grazing, wood and other harvesting, tourism and recreation allowed in Traditional Use zone.
Protected Landscape (IUCN category V) - 3	To protect both natural landscapes and natural and cultural landscapes created as a result of harmonic interaction between humans and the natural environment, and to preserve the living environment and carry out recreational, tourism and traditional economic activities.	Large	Sustainable grazing, wood and other harvesting, tourism and recreation allowed in Traditional Use Zone and Visitors' zone correspondingly.
Multiple Use Area (IUCN category VI) - 1	For organized and renewable natural resources use-oriented economic activities by foreseen or requirements of environmental protection.	Large	Sustainable grazing, wood and other harvesting, tourism and recreation allowed (in Traditional Use Zone and Visitors' zone correspondingly).

PAs cover 11.42% (796 187 ha) of the country's territory as shown in Figure 3-1 (see Appendix 2 for a full list of all PAs with their sizes and regional locations).

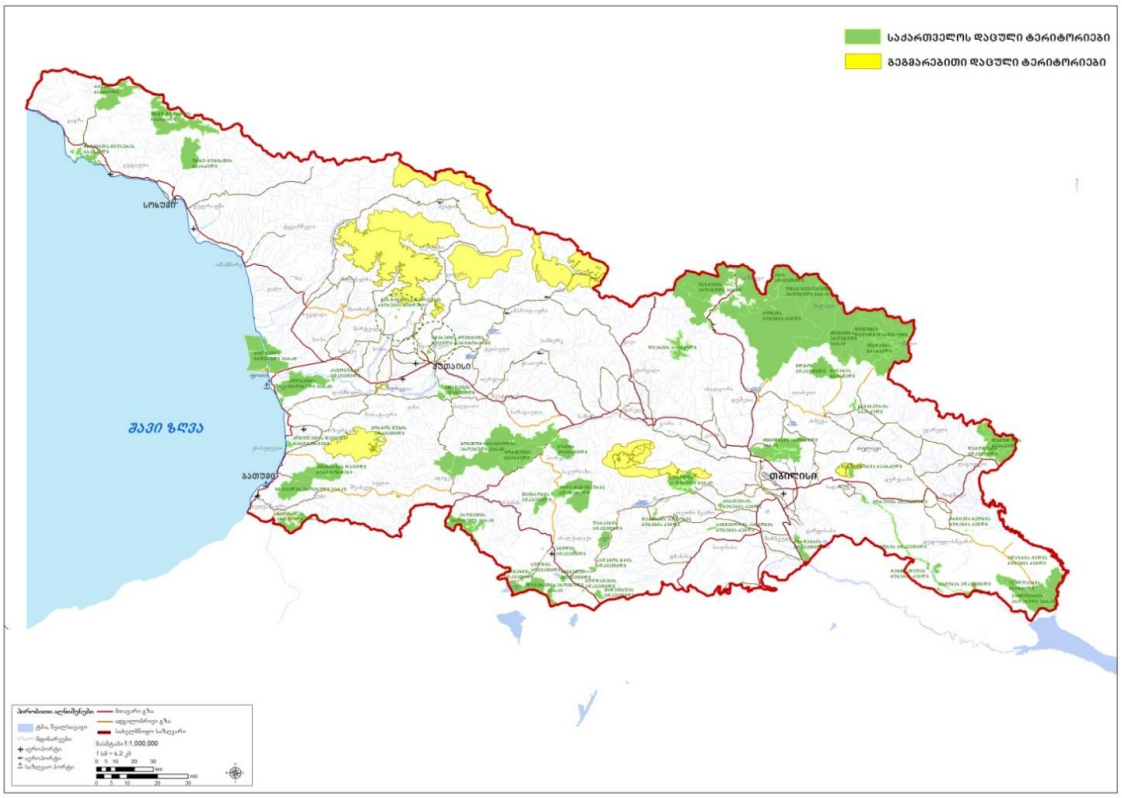
Planning for the PA system is carried out by the Ministry of Environment Protection and Agriculture (MEPA) of Georgia, the Agency of Protected Areas (APA) (a legal entity of public law under the Ministry) and the Ministry of Regional Development and Infrastructure of Georgia.[2] The state policy of the PA system establishment, its functioning and management, as well as coordination and controlling actions are carried out by MEPA. Key decisions on the designation, expansion, upgrading or downgrading of PA categories are made by the Georgian Parliament based on the Ministry's recommendations.

APA manages all PAs except for the Protected Landscapes. APA undertakes its work through 21 Territorial Administrations based on the existing regulations: Georgian Law on Protected Areas System (1996) and the Order of the Minister of Environment Protection and Agriculture on Approval of the Statute of the LEPL - Agency of Protected Areas (2019). Among others, the responsibilities of the APA are:

- Management of the I-IV PA Categories;
- Carry out maintenance, supervision, preservation, restoration and protection measures;
- Develop relevant laws and sublegal normative acts;
- Improve management mechanisms and raise the stuff qualification.

[2] The Georgian Law on Protected Areas System, 1996.

Figure 3-1: Map of protected areas in Georgia



Source: APA (2022)

The responsibilities and structure of the Territorial Administrations are defined in the Order of the Minister of Environment Protection "on Approval of Typical Statute of Territorial Administrations of the Agency of Protected Areas" (2013). Among others, the responsibilities of the Administrations are as follows:

- Protect, care and restore protected areas and its ecosystems, species and their distribution areas;
- Control of the territory, the use of natural resources;
- Ensure sustainable use of protected areas.

Protected Landscapes are managed by the management units established under corresponding Municipalities where they are located (i.e. Akhmeta, Dusheti and Kazbegi Municipalities)[3]. The responsibilities and structure of the Protected Landscape Administrations are defined in their Statutes. Their responsibilities include:

- Protection of natural ecosystems;
- Protection of historical-cultural heritage;
- Protection, restoration and sustainable use of natural resources;
- Support traditional agricultural activities and its sustainable development;
- Support of tourism development;
- Forest management (in case of Tusheti PL);

The management of any PAs is carried out based on the management plans or temporary regulation rules approved by the Georgian Government.

[3] Machakhela PL is established on 21.09.2022 and does not have the management unit yet.

APA receives funding from the following sources discussed in more detail in Section 8:

- State budget
- Own revenues
- Grants mostly from donors such as CNF, UNDP and KfW
- Special purpose funding (a form of grant funding)

The main funding sources for the Protected Landscapes are similar to those of APA. Local government budgets are the main source. Additionally, the Administrations can also carry out supporting entrepreneurial activity to fulfil their goals and objectives[4].

Approximately 600 permanent and 150 part-time contracted staff carry out PA management with the majority (95%) employed by APA and the remainder by the Protected Landscapes management authorities (Table 3-2). There are also 72 vacant positions in PA management.

Table 3-2: Protected area management staff numbers (October 2022)

Management Unit / PA Administration	Permanent Staff	Part-time staff with shot-term contracts	Vacant Posts
APA head office staff			
Total	**56**	**51**	**5**
APA territorial administrations staff			
Algeti NP	22	3	1
Ajameti MR	16	-	-
Batsara-Babaneuri PAs	17	-	-
Borjom-Kharagauli NP	85	6	4
Chachuna MR	8	-	1
Erusheti NP	12	-	4
Imereti Caves PAs	25	40	1
Javakheti PAs	15	2	12
Kazbegi NP	21	3	2
Kintrishi PAs	11	-	-
Kobuleti PAs	8	2	1
Kolkheti NP	46	6	6
Lagodekhi PAs	22	1	3
Machakhela NP	17	1	1
Mariamjvari NR	14	2	3
Mtirala NP	17	2	3
Pshav-Khevsureti PAs	25	1	1
Samegrelo and Okatse PAs	29	6	5
Tbilisi NP	37	9	5
Tusheti PAs	25	2	9
Vashlovani PAs	40	5	1
Total	**512**	**91**	**63**
Protected Landscapes administrations staff			
Tusheti PL*	17	4	-
Aragvi PL	7	-	4

[4] Statute of Tusheti PL Adinistration (2016); Statute of Aragvi PL Adinistration (2021); Statute of Truso PL Administration (2021).

Truso PL	7	4	-
Total	**31**	**8**	**4**
All PA management staff	**599**	**150**	**72**

* Adding 6 staff under consideration for 2023

4 CURRENT VALUES ASSOCIATED WITH PROTECTED AREAS

This section focuses on attaching monetary values to the ecosystem services currently provided by the protected areas system to the extent possible. These values are useful to establish a baseline and are needed when projecting the likely changes in ecosystem values that would be associated with increased funding and associated management efforts.

As noted above, valuation focuses on the following ecosystem services:

- Pasture provision
- Wood harvesting
- Harvesting of natural products (NTFPs)
- Water provision and regulation
- Natural hazard mitigation
- Carbon sequestration
- Pollination and pest control
- Tourism and recreation
- Existence and cultural values

4.1 Pasture provision

Livestock rearing plays an important role in Georgia's economy particularly in rural areas where livestock is valued for livelihoods and for socio-cultural reasons. Pastures where livestock such as sheep, goats and cattle can graze are therefore a valued asset. Such areas are provided by a selection of PAs including Borjomi-Kharagauli, Tusheti, Vashlovani and Javakheti which have extensive grasslands providing good pasture.

The rental amounts paid for pasture areas were used to estimate a baseline value of the pasture services provided by PAs. This ensured a conservative estimate of values as rentals are a relatively narrow indictor of value to pasture users as they don't include wider benefits of animal raising which relies on pastures. Approximately 24,000 ha of pasture inside PAs is leased at rates that generally vary between GEL 9 and 16/ha/yr which translates into an annual value of GEL 330,000 (Table 4-1). More than half of this value comes from Borjomi-Kharagauli. In addition, pastureland is provided for traditional pasture at no fee although it still has a value which should be roughly equal to its hypothetical lease value of GEL 518,000. Total pasture value is therefore approximately GEL 850,000/yr.

Table 4-1: Current annual values associated with pasture provision in protected areas (2022)

Protected Areas Administration	Land currently leased for pasture		Land currently use for traditional pasture (no fee)		Total value of current pasture ecosystem services (GEL)
	Land area (ha)	Annual rental value (GEL)	Land area (ha)	Hypothetical annual rental value (GEL)	
Borjomi-Kharagauli National Park	11 921	179 821	3 663	55 643	235 465
Vashlovani Protected Areas	6 615	61 718	2 984	27 845	89 563
Javakheti Protected Areas	4 073	66 344	1 199	19 291	85 636
Lagodekhi Protected Areas	1 162	17 183	295	4 367	21 550
Chachuna Managed Reserve	552	5 141	45	415	5 557
Kazbegi National Park	-	-	16 170	242 550	242 550
Tusheti Protected Areas	-	-	11 082	88 656	88 656
Pshav-Khevsureti Protected Areas	-	-	4 036	60 539	60 539
Erusheti National Park	-	-	1 251	18 761	18 761
Total	**24 322**	**330 208**	**40 724**	**518 067**	**848 275**

Source: APA data

4.2 Wood harvesting

Forest is the most common habitat type in Georgia including in its PAs. Wood harvesting takes place in numerous PAs only for use of adjacent communities. In many PAs wood harvesting is guided by forest management plans which specify harvest amounts and locations that are sustainable and compatible with biodiversity conservation goals. Most of the wood currently harvested in PA is firewood with some round logs also extracted for higher value uses only in two PAs.

The way in which wood is harvested is undergoing reform under a new Forest Code of Georgia approved in 2020. The Code will have far-reaching consequences for the way forest resources are to be managed in the future. All longer-term forest management concessions and the social wood programme (social cutting) will be phased out. Extracting firewood under this programme is not done sustainably, efficiently and results in natural resource damages including in PAs. Cutting of timber under the social wood programme is allowed until January 2023, and within the protected areas, cutting of timber until January 2026. Wood-related commercial activities in state forest will then exclusively be implemented by forest management bodies include APA. Firewood will be gathered and processed based on its evaluated potential by qualified workers within or contracted to forest management bodies.

The value of wood harvesting from within PAs was estimated based on volumes harvested multiplied by market prices which average GEL 85/m^3 for firewood. Approximately 15,500 m^3 of wood was harvested in 2021 with a market value of GEL 1.4 million (Table 4-2). More than half of this value comes from Borjomi-Kharagauli National Park.

Table 4-2: Current annual values associated with wood harvesting in protected areas (2021)

Protected Areas Administration	Current annual volume of wood harvested (m3)			Current annual value of wood harvested (GEL)		
	Round logs	Firewood	Total	Round logs	Firewood	Total
Ajameti Managed Reserve	-	330	330		28 843	28 843
Algeti National Park	-	910	910		79 661	79 661
Borjomi-Kharagauli National Park	290	8 629	8 918	60 539	754 996	815 535
Javakheti Protected Areas	-	392	392		34 300	34 300
Kintrishi Protected Areas	-	47	47		4 085	4 085
Kolkheti National Park	-	1 790	1 790		156 625	156 625

Lagodekhi Protected Areas	-	1 447	1 447		126 627	126 627
Machakhela National Park	-	297	297		25 994	25 994
Mariamjvari Strict Nature Reserve	-	65	65		5 688	5 688
Mtirala National Park	-	-	-		-	-
Pshav-Khevsureti Protected Areas	-	30	30		2 625	2 625
Tbilisi National Park	-	1 241	1 241		108 550	108 550
Total	**290**	**15 177**	**15 467**	**60 539**	**1 327 993**	**1 388 532**

Source: APA data

4.3 Harvesting of natural products (NTFPs)

Georgian protected areas provide an opportunity for the harvesting of natural products or non-timber forest products (NTFPs) which include grasses, berries, fruits, nuts, fish, etc. Collection of these products is allowed in the traditional use zones of the PAs and they play an important role in supporting rural community livelihoods.

Estimates of NTFP use and value in some PAs and their support zones have been undertaken previously (see Flores 2010; Flores 2011; UNDP 2016; act 2019). These assessments are however dated and do not cover the whole PA system. New data on the use of the NTFPs was therefore collected from the the staff of each of the 21 PA administrations and Tusheti PLs. They were asked to use their local knowledge to provide data on the type of NTFPs harvested, average amounts harvested (kg) and their market value (GEL/kg).

It was found that that NTFPs are harvested or collected in the Traditional Use Zones of 26 PAs including National Parks, Managed Reserves and Tusheti Protected Landscapes. The main products collected are hay, mushrooms, berries, fruits, nuts, medicinal plants, other herbs, ornamental plants, honey, and fish.

Some examples of the approximate scale and annual value of harvested products include the following:

- **Hay** harvesting is carried out in 11 PAs by approximately 1,033 households and had a total market value of GEL 5.02 million (90 % of the value of all NTFPs). Most of the harvesting takes place in Ktsia-Tabatskhuri MR where 550 households harvest hey worth of about GEL 4.4 million.
- The largest number of households (about 1,346) are involved in collecting **mushrooms** in 14 PAs. About 10 kg per year is collected by each household resulting in a total value of about GEL 60,175.
- **Medical Plants** are collected by about 181 households in four protected areas, with a total value of about GEL 25,870.
- **Berries, fruits and different herbs** are collected in 11 protected areas. About 1,166 households collect these products with a total value of about GEL 119,970.
- Different sorts of **nuts** are collected by 416 households in five PAs. About 79 kg is collected annually per households with a total value of about GEL 56,500.
- **Fish** are caught in seven protected areas (Kolkheti NP, Khanchali Lake MR, Paravani Lake MR, Saghamo Lake MR, Chachuna MR, Gorughi MR, Iori MR) by about 264 households and have a total value of about GEL 92,305.
- About 32 households keep bees in 130 beehives inside the territory of four PAs (Mtirala NP, Borjomi NP, Vashlovani NP and Tusheti PL). Each household produces about 600 kg of **honey** per year, with a total value of about GEL 200,250.
- **Ornamental plans** are collected in Lagodekhi MR by about 100 households and have a total value of approximately GEL 30,000.

- There is a small enterprise in Tusheti PL which collects different NTFPs such as herbs, berries and medical plans, packages them and sells them online or at markets.

In total, roughly 4,583 households are involved in collection of all the different types of the NTFPs worth about GEL 5.6 million/yr (Table 4-3).

Table 4-3: Number of households harvesting NTFP and their annual market value per PA (2022)

Protected Areas Administration	Protected area	Nr of households that benefit	Market value of products (GEL)
Kolkheti NP	Kolkheti NP	43	71 036
Kobuleti PAs	Kobuleti MR	30	2 700
Mtirala NP	Mtirala NP	133	58 050
Kintrishi PAs	Kintrishi NP	78	23 400
Machakhena NP	Machakhela NP	75	5 950
Ajameti MR	Ajameti MR	300	7 500
Borjomi-Kharagauli NP	Borjomi NP	330	148 450
Borjomi-Kharagauli NP	Nedzvi MR	20	1 000
Borjomi-Kharagauli NP	Ktsia-Tabatskuri MR	550	4 400 000
Javakheti PAs	Javakheti NP	135	99 425
Javakheti PAs	Tetrobi MR	170	270 600
Javakheti PAs	Khanchali Lake MR	83	36 039
Javakheti PAs	Bughdasheni Lake MR	20	36 000
Javakheti PAs	Madatapha Lake MR	25	56 250
Javakheti PAs	Paravani Lake MR	180	61 550
Javakheti PAs	Sagamo Lake MR	62	12 125
Algeti NP	Algeti NP	195	21 850
Tusheti PAs	Tusheti PL	252	129 987
Kazbegi NP	Kazbegi NP	50	25 000
Lagodekhi PAs	Lagodekhi MR	1 600	101 000
Pshav-Khevsureti PAs	Pshav-Khevsureti NP	82	15 990
Chachuna MR	Chachuna MR	50	4 800
Mariamjvari NR	Korugi MR	40	1 625
Mariamjvari NR	Lori MR	15	630
Mariamjvari NR	Tsiv-Gombori MR	19	1 100
Vashlovani PAs	Vashlovani NP	1	15 300
Total		**4 538**	**5 607 357**

Aside from honey produced inside PAs, it is worth noting that based on the information collected from PA administrations, bee keeping is traditionally practiced in the villages adjacent to most PAs. According to a very rough estimate of the PA administration representatives, a total of about 900 households are engaged in bee keeping using about 26,500 beehives (the number of hives per household ranges from 1 up to 120 and more) in and adjacent to all PAs in Georgia. The average annual gross income for each of these household is about GEL 11,500/yr based on total production volume of 10.4 tonne/yr and an average price of honey of GEL 23/kg.

4.4 Water provision and regulation

The link between watershed protection and the natural or near-natural habitats generally associated with PAs is well-established. In essence, natural habitats result in natural water flows which ensure low levels of erosion, sedimentation and better water quality. They also regulate or smooth out flows over time reducing peak flows associated with higher flood risks while increasing low flows thereby ensuring greater water availability or supply especially during dry seasons. This can play a key role in

adaptation to climate change. Often PAs are also located in mountainous upper watersheds or were established explicitly to protect key upper watersheds.

Most countries, including Georgia, recognise the clear link between land use management and water resources outcomes and therefore practice watershed management as a key component of overall water resource management. In Georgia's case the importance of watershed management is further increased relative to other countries due to its heavy reliance on hydroelectricity. Watershed degradation can change water flow volumes and result in sedimentation that decrease the potential and value of hydroelectric reservoirs.

Georgia has seven large hydroelectric power stations attached to reservoirs with a total installed capacity of over 1,991 megawatts (MW) and electricity production of approximately 5,303 million kWh/yr. World Bank (2020) estimated that this level of production was about 318 million kWh/yr below expected production with 80% of this annual electricity generation loss attributable to sedimentation. The loss due to sedimentation was valued at US$ 21 million/yr based on average consumer electricity tariffs. At a wider scale, the overall cost of agricultural and forest land degradation, which disproportionately impacts the rural poor who derive their livelihoods from land, was estimated at US$ 128 million/yr (World Bank, 2020).

Examples of the key roles and value in water provision and regulation for individual Georgian PAs are as follows:

- Although hydro power plants are located outside PAs, many of hydropower plants are benefitting from water resources, originated in and around PAs. For example, two hydro power plants in Kakheti region use water originating on the territory of Tusheti PAs. (Flores and Adeishvili, 2012). The functioning of two hydro power plants in Adjara will depend on the water flows from Machakhela and Kintrishi PAs. (Adeishvili, 2016). At a smaller scale some local communities also use rivers and streams originated in the PAs to power their water mills (Adeishvili, 2016).
- Ecosystems of many PAs in Georgia play a critical role in the provision of water resources for adjacent populations nearby. The city of Batumi, with population about 161,200, receives water from the Chakvistavi and Korolistskali rivers, both originating in Mtirala NP. The adjacent 22 villages of three municipalities (Kobuleti, Khelvachauri and Keda), with about 16,620 inhabitants, are also supplied with water from Mtirala NP. In some places water originating from PA is very high quality and is used by communities for drinking and hygiene without treatment, for example the Machakhela and Kirnati communities, located in surrounding of Machakhela NP (Adeishvili, 2016).
- The spring mineral water coming from Borjomi-Kharagauli NP has been the key source for IDS Borjomi Gerogia bottled spring water for 132 years. This spring water is the most well known in Georgia and has the largest share of the local market whilst also exporting over half of its production to 40 countries. IDS Borjomi Georgia produces 400,000 ~ 500,000 liters of spring water per day with an annual turnover value of US$ 26 million (Flores and Adeishvili, 2012).[5]
- The rivers and streams originating in protected areas provide water for agriculture. For example, the six major irrigation districts in Kakheti region are highly dependent on the Alazani River, which originates in Tusheti PAs. Viticulture and wine making is one of the most important economic activities in Kakheti; about 65-70% of all Georgia's vineyards are located in the region. Other crops cultivated under irrigation schemes in Kakehti region includes wheat, maize, sunflower, potatoes, other vegetables and fruits and fodder crops.

[5] IDS Borjomi Georgia actively participates in a Borjomi forest restoration program since 2012, during this time approximately 17,000 trees have been planted.

- Freshwater ecosystems of protected areas provide local communities with opportunities through fish farming in and around PAs. In the support zone of Mtirala NP, 30 fish-farms with 74 employees were reported in 2011, while there were three fishponds with 10 employees in the support zone of Borjomi-Kharagauli NP. In coastal regions, the rivers originating in PAs also provide nutrients that support fish spawning and nursery areas and ensure sustainable marine fisheries.[6]

To attach a baseline value to watershed protection, the above indicators of importance and the following published sources on watershed protection and supply values from elsewhere were used:

Table 4-4: Ecosystem service valuation studies used to estimate local values for water services

Author	Key findings
Getzner (2009)	Estimated the value of water supply at EUR174/ha/yr in the Tatra National Park in Poland and at EUR48/ha/yr in the Slovensky Raj National Park in Slovakia.
Christie and Rayment (2012)	Focused on Sites of Special Scientific Interest (SSSI) in England and Wales including the value of regulation of water flows. They assessed the marginal amount that people were willing to pay to maintain good ecological condition relative to a decline in condition associated with the removal of funding for the management of the Sites. Their finding included value of GBP110/ha/yr for grasslands, GBP121/ha/yr for broadleaved mixed woodland and GBP200/ha/yr for marshes and swamps.
Häyhä et al. (2015)	Estimated that fresh water provision by forest ecosystems in North Italy was worth about EUR75/ha/yr. They noted that aside from regulating the hydrological cycle, the root systems of trees and other plants keep soils porous and allow water to filter through various layers of soil before entering ground water.
Quintas-Soriano, et al. (2016)	Assessed a number of ecosystem services in Spain and estimated the average value for water purification value at EUR135/ha/yr. Note that this value applies to all natural areas and PAs are likely to have higher values given their importance for conservation.
Nuñez et al. (2006)	Evaluated the value of native temperate forests in supplying water for human consumption to one of the main cities in Southern Chile. The economic benefits of native forests were estimated at US$223/ha/yr.
Brenner-Guillermo (2007)	Focused on the Catalan region in Spain and estimated the value of water supply and regulation provided by temperate forests at US$403/ha/yr and at US$5 for grasslands.
Chekun (2014)	Chose an average of $36/ha/yr to value the hydrological function of the Yeki-Godera forest ecosystems in southwest Ethiopia.
Sutcliffe (2009)	Focused on sedimentation only and attached a cost of US$4.77/ha/yr to increased sediments load associated with deforestation in the Baro River Basin in Ethiopia near the Sudanese border. These costs where associated with the need to clean sediment from irrigation canals.
Kipkoech et al. (2011)	Found that forests in the Mau Forest Complex in Kenya had a watershed management value of $56.8/ha/yr. An additional water supply value of $147/ha/yr for Miombo woodlands.
Nlom (2011)	Used a value range of US$3-10/ha/yr for watershed protection associated with forest within protected areas in the Congo Basin based on the findings of Debroux et al (2007).
Hansen (2006)	Estimated the value of watershed protection and soil conservation for Cambodian forests based on other research on forest in South East Asia and

[6] The value of fish caught inside PAs are covered in Section 4.3

	used an average of $70/ha/yr for watershed protection plus $60/ha/yr for soil conservation in 2001 terms.

The average for the above estimates were appropriately adjusted to local circumstances to arrive at an average across the board value of GEL 192/ha/yr for low to medium degradation areas. Values were then varied per degradation level in recognition of the link between higher degradation and lower levels of watershed protection. For example, highly degraded areas are often eroded and offer very little in the form of watershed protection.[7] Per hectare values were then multiplied by the extent of different habitats in all protected areas to generate a total baseline value estimate of GEL 114 million/yr.

4.5 Natural disaster mitigation

Georgia is vulnerable to natural disasters which are becoming more frequent and of a greater intensity globally due to climate change. The country's terrain, meteorological conditions and high anthropogenic pressure on the environment create favourable conditions for avalanches, landslides, floods, washing of riverbanks, draughts, hail, soil erosion, strong winds, natural fires, earthquakes, etc. During 2021 the number of extreme hydro meteorological events increased by 15% and extreme geological events by 58%. Consequently, the damage from these events has increased and had already reached GEL 389 million in 2015 (Decree of Georgian Government #4).

Natural ecosystems are a cost-effective way to mitigate various extreme weather events and their impacts. Well managed protected areas with their natural ecosystems can mitigate different hazards. For example, intact forests can control avalanches, landslides and prevent soil erosions, floodplains and wetlands provide space for floodwater and help to absorb it, natural vegetation in dryland and (semi-)arid areas can prevent desertification; intact forest ecosystems are more resistant to fires (Worboys, 2015). The importance of the Alpine forests in mitigating rock falls, landslides and avalanches was recognized by the Swiss government around 150 year ago and 17% of total forests are managed for their protection functions (Stolton, 2008).

The impact of natural ecosystems in Georgian PAs in preventing and mitigating natural hazards has not been quantified or assessed in detail. However, their importance is highlighted in several assessments (e.g. Flores, 2011; Flores, 2012; UNDP, 2016). In addition, the importance of forest and shrubs ecosystems in prevention of erosion and avalanches is recognised in its management plan as one of the main aims of the establishment of Tusheti PAs. The rivers originating in Mtirala, Kintrishi and Machakhela PAs play an important role in the Black Sea coast stabilisation. The sediments brought by these rivers contribute to the prevention of the coastal erosion, which became a concern in Georgia due to constructed and planned hydropower dams in Turkey (Adeishvili, 2016).

Because of the lack of information, it is difficult to estimate the economic value of disaster mitigation services provided by Georgian PAs. However, some indication of avoided future damages can be taken from the study by Brander et al. (2016) focused on all forest areas in the Adjara region. The study estimated the damage costs of landslides per year up to 2035 under different land cover scenarios, namely the current situation where cover remains the same, a Degradation Scenario (comparable to the BAU Funding Scenario) and a Restoration Scenario (comparable to the Increased Funding Scenario). It was found that, by 2035, the Restoration Scenario would gradually be associated with US$ 772,000/yr greater damage costs avoided relative to

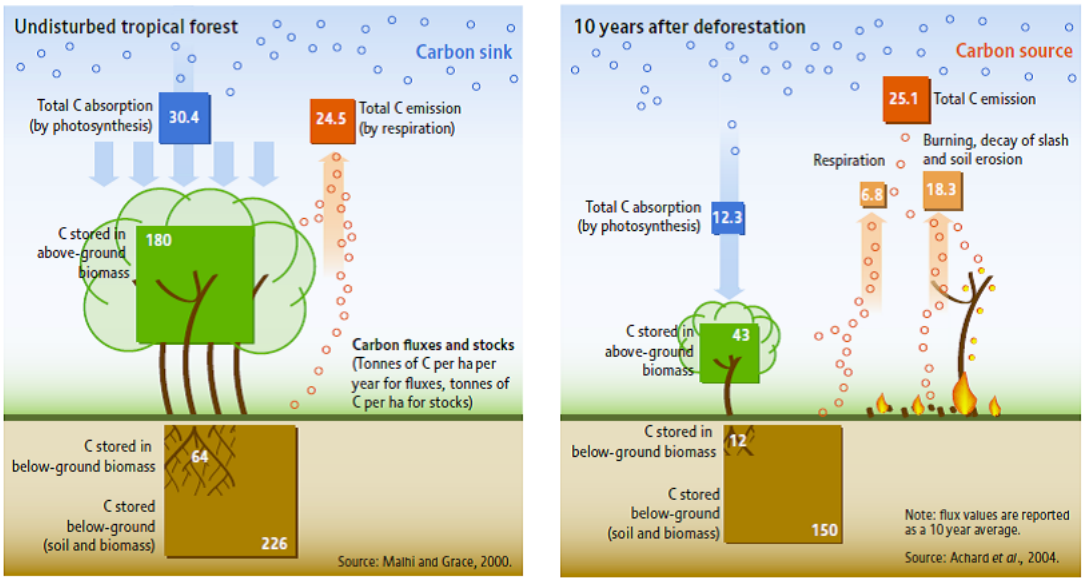
[7] Note that these estimates which are mostly linked to forest habitats were used for all habitat types within the protected areas as the key driver of watershed services provision is the existence of intact natural habitat regardless of its type. In other words, there is no clear reason to suspect that natural forests should be favoured over natural grassland for watershed protection services

the Degradation Scenario. Roughly 20% of Adjaran forest areas are inside PAs (Kintrishi PAs, Mtirala NP, Machakhela NP). It was therefore assumed that US$ 154,400/yr (20% of US$ 772,000/yr) is an approximate reflection of the added value of the Increased Funding Scenario relative to the BAU specifically for Adjaran PAs. These estimates where therefore updated and converted to GEL and included in the cost-benefit analysis. This is useful for the consideration of future scenarios (see Section 6.3) though it does not allow for the estimation of a current baseline damages avoided values.

4.6 Carbon sequestration

Climate change is primarily driven by human activities and has reached global crisis levels. Impacts include those affecting livelihoods, food and water security, health, ecosystems, infrastructure etc. Carbon dioxide is the most common greenhouse gas (GHGs) responsible for climate change.

Figure 4-1: The relationship between degradation/deforestation and carbon sequestration



Source: UNEP (2009)

Carbon sequestration is the process whereby ecosystems gradually remove harmful carbon dioxide from the atmosphere. The carbon is then accumulated and stored in wood, other biomass and soils keeping it out of the atmosphere. Critically, the vegetation within ecosystems can only provide this benefit if they are allowed to grow and keep sequestering or removing additional carbon every year. If they are degraded over time (through, for example, deforestation) then instead of removing carbon and combating climate change they become a source of harmful carbon emissions and contribute to climate change (see the figure below for a graphical illustration of this process). With reference to the scale of this problem, the United Nations estimates that degradation and deforestation of the world's tropical forests are cumulatively responsible for about 10% of net global carbon emissions.[8]

The important role of healthy natural ecosystems, such as those in Georgian protected areas, in sequestering carbon and regulating the global climate has been widely recognised. To attach a value to their carbon sequestration, current biomass carbon stocks were first estimated based on data from Georgia along with international

[8] See http://theredddesk.org/what-is-redd

averages. Table 4-5 shows the above and below ground biomass carbon stock per hectare estimates for the main carbon containing habitats in the protected areas system assuming low levels of degradation.[9] National estimates for deciduous and coniferous forest were provided by Dr Zviad Tiginashvili, Givi Vachnadze, Diuli Tsereteli and Besarion Aptsiauri based on research they have undertaken over the last 15 years[10]. Georgian data was also available for grasslands in Vashlovani.

Table 4-5: Above and below ground biomass carbon stock per hectare for different habitats assuming low degradation levels

Habitat type and source	Biomass carbon stock (tC/ha)	Notes
Deciduous forests		
Dr Zviad Tiginashvili et al.	76.44	Based on various studies in Georgia over last 15 years. Trees only so excludes undergrowth, leaf litter, etc.
Coniferous forests		
Dr Zviad Tiginashvili et al.	104.16	Based on various studies in Georgia over last 15 years. Trees only so excludes undergrowth, leaf litter, etc.
Bush and shrubs		
Reutch and Gibbs (2008) for the IPCC	7.4	Global temperate shrub cover
Grasslands		
Reutch and Gibbs (2008) for the IPCC	4.5	Global temperate grasslands
Reutch and Gibbs (2008) for the IPCC	2.5	Global temperate sparse grassland, grassland mosaic
GIS Lab (2014)	2.72	Estimates for Vashlovani semi-arid grasslands
Wetlands		
Hendricks et al (2020)	143	Average for all European wetlands incl soil carbon
Hendricks et al (2020)	14.3	Average for all European wetlands excl soil carbon

Carbon stocks per hectare where then adjusted to reflect conservative stock differences per degradation level as follows:

Low degradation: *100%*
Low to medium degradation: *85% relative to low degradation stock*
Medium degradation: *75% relative to low degradation stock*
Medium to high degradation: *65% relative to low degradation stock*
High degradation: *45% relative to low degradation stock*

This result in the per hectare stock estimates per habitat and degradation level in the table below.

Table 4-6: Carbon stocks per habitat and degradation level

Degradation level	Carbon stock average (t/ha)								
	Deciduous forest	Coniferous forest	Bush and shrubs	Grass lands	Arid and semi-arid ecosystems	Wetlands (bogs and fens)	Lakes & rivers	Unvegetated and sparsely vegetated areas	Grasslands in Vashlovani and Chachuna
Low degradation	76.4	104.2	7.4	4.5	-	14.3	-	-	2.7
Low to medium degradation	65.0	88.5	6.3	3.8	-	12.2	-	-	2.3
Medium degradation	57.3	78.1	5.6	3.4	-	10.7	-	-	2.0

[9] To be conservative, carbon stocks were assumed to be zero for the relatively small areas in the PA system that are arid, semi-arid or sparsely vegetated.

[10] In the framework of Shota Rustaveli National Scientific Foundation.

Medium to high degradation	49.7	67.7	4.8	2.9	-	9.3	-	-	1.8
High degradation	34.4	46.9	3.3	2.0	-	6.4	-	-	1.2

Stocks were then multiplied by hectare areas per habitat type and degradation level resulting in an estimate of current carbon stock within all protected area of approximately 23 million tC.

All estimates included above and below ground biomass carbon and not soil organic carbon. Soil carbon pools tend to remain relatively stable for a given habitat except where significant land use changes occur such as conversion of land to cultivated land. It does, however, need to be recognised that soils often contain substantial carbon stocks. Their exclusion from stock estimates in this assessment thus ensures conservatism.

To estimate the value of carbon stocks it was then necessary to find a reasonable estimate for the value of a ton of sequestered carbon. There are two potential approaches in this regard. The first is to use estimates of the climate change damages avoided by decreasing the amount of carbon in the atmosphere. The most recent social cost of carbon estimates published by the World Bank for use in economic analysis and primarily based on the 2017 High-Level Commission on Carbon Prices. The mean value between the low and high values provided by the World Bank ($63/tCO^{2}e in 2022) was used as a base case (World Bank, 2017). The alternative approach is to use market prices for carbon offsets as a proxy bearing in mind that these prices are subject to market fluctuation. The Ecosystem Marketplace State of the Voluntary Carbon Market estimates an average price of $3.82/t$CO_2$ for carbon credits in 2021. Given the potential validity of both approaches, the average between them (i.e. $34/t$CO_2$ or $125/tC) was used in assessment to reflect the global benefits of carbon sequestration.

This per tonne value was multiplied by the above carbon stock to generate a total carbon stock value estimate of GEL 9.2 billion. Annual sequestration rates and values in PAs are unknown. Carbon stock values were therefore spread evenly over 100 years to get some highly approximate proxy indicator of annual carbon sequestration of GEL 92 million/yr. Bear in mind that PAs can be net carbon absorbers or emitters each year depending on whether degradation and deforestation increased (resulting in net carbon emission) or decreased (resulting in net carbon absorption). This is not captured by the current annualised stock value. The analysis of future PA funding scenarios accounts for this with increased emissions for the BAU Funding Scenario relative to the Increased Funding Scenario.

4.7 Pollination and pest control

Pollination is a vital ecological service provided by a wide range of insect species including bees, wasps, flies, butterflies, beetles and moths. Recent estimates show that about 88% of all flowering plants and 35% of the global plant-based food supply relies on pollinators (CBD, 2018). The global value of crop pollination services has been estimated at US$ 195 - 387 billion annually (Porto, 2020).

Intact and biodiverse natural areas such as those in protected areas tend to be associated with higher varieties and concentrations of natural pollinators. Pollinator diversity enhances pollination especially during environmental and climatic changes and pollinator diversity has been shown to increase the quality and quantity of crop yield (see Katumo, 2022; Greenleaf and Kremen, 2006). Wild pollinators act as a form of insurance or partial substitute for farmers in the event of an unexpected decline in commercial bee populations (for example, due to a disease outbreak) (Vanbergen et al., 2014). Focusing on bees, Kleijn et al (2015) found that wild bee pollination

contributed approximately the same to global agricultural value as pollination by managed bees.

The agricultural sector in Georgia depends on pollination services of insects to produce food. Although far more research is needed in Georgia, the wild bees and other insects, as well as honey bees in and around protected areas are by far the best way to pollinate fruits and crops in support zones successfully and thus support agriculture (UNDP and WWF, 2013). For example, numerous agricultural products (such as apples, berries, plums, almond, nuts, citrus, onions, broccoli, carrots, sunflowers, mellon, cauliflower, celery, cucumbers, legumes, filed crops, other fruits and vegetables) are produced in support zones of the Borjomi-Kharagauli NP, Mtirala NP and Tusheti PAs and depend on the pollination services of these PAs (Flores and Adeishvili, 2012).

The value of pollination services provided by PAs have not been estimated in Georgia. To attach a baseline value to pollination services, the following international published sources were used:

Table 4-7: Ecosystem service valuation studies used to estimate local values for pollination services

Author	Key findings
Tibesigwa (2019)	Found that pollination benefits from natural forests were significant to surrounding small-scale farmers in Tanzania growing pollination-dependent crops. Using their data, it can be estimated that the average increase in crop revenues was US$155 per hectare of forest within a 750m distance from crops (to take into account the average range of pollinators).
Hipolito et al. (2019)	Estimated that value of bee pollination service provided by two protected areas in Brazil to surrounding farmers. For the Serra da Bocaina PA they found a value of US$564,000 per year and for the Mata do Jambreiro PA, a value of US$246,000. These values can be translated to approximately US$31/ha/yr and US$8/ha/yr respectively for the area within 750m of the PA boundaries where one can be confident that pollination services are being provided to adjacent farms.
Quintas-Soriano, et al. (2016)	Assessed several ecosystem services in Spain and estimated the average value for biological control at EUR15.43/ha/yr. Note that this value applies to all natural areas and PA are likely to have higher values given their importance for conservation.
Brenner-Guillermo (2007)	Assessed a variety of ecosystem services associated with Catalonian coastal habitat in Spain. For pollination they estimated a value of US$400/ha/yr for forests and US$32/ha/yr for grasslands.
Curtis (2004)	Assessed the Wet Tropics World Heritage Area (WTWHA) in Australia and found that the value of pollination services from this forest area were approximately AUS$8.45/ha/yr (for biological incl pest control they were AUD15.46).
Ricketts et al. (2004)	Found a 20.8% increase in coffee yields near two patches of native forests in Costa Rica. Based on this, they estimated the value of pollination at US$129 - 434/ha/yr noting that the effect of insect pollination on yield of coffee tree crop was high at distances up to 700–800m from forests and that the effect was lost at 1400–1600m from the forest.
Priess et al. (2007)	Estimated the value of pollination services to coffee growers in Indonesia at €46 – 205/ha/yr.
Mushambanyi and Munyuli (2014)	Found that bees in Ugandan forests contributed $650/ha/yr to coffee production levels.

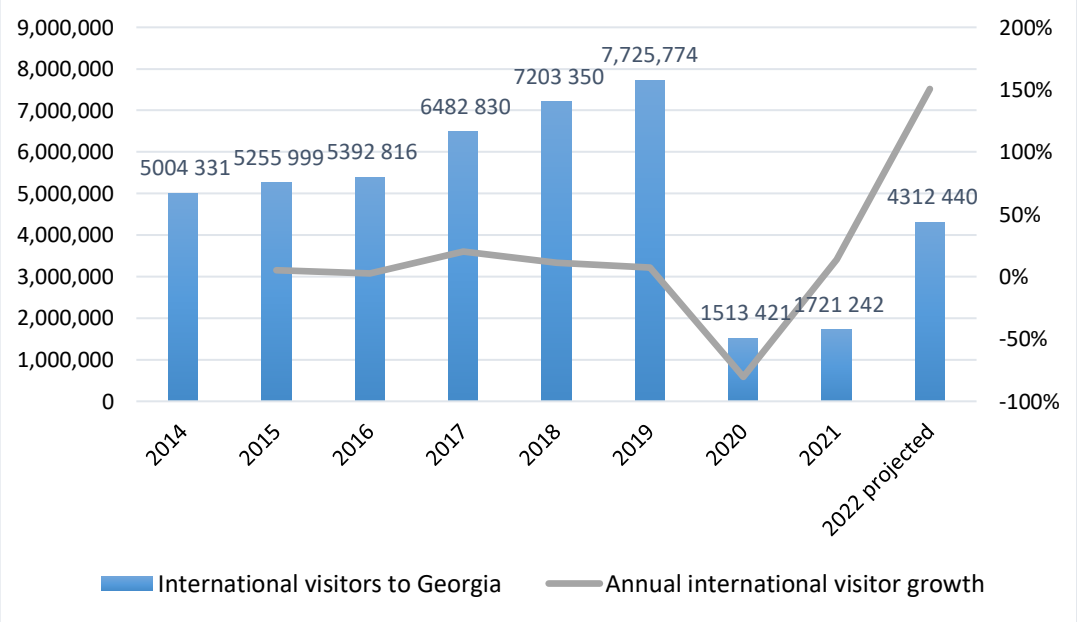
The averages for the above estimates were appropriately adjusted to local circumstances to arrive at values of GEL 245/ha/yr for pollination services assuming low to medium degradation levels. Values were then varied per degradation level in recognition of the link between higher degradation and lower levels of pollination services. Note also that per hectare values were then multiplied by the extent of land falling within approximately 750m of protected areas border to generate the baseline value estimate of GEL 6.7 million/yr.

Similar to pollination services, PAs are also generally associated with insects, birds and animals that assist with the natural control of pests. Pest or biological control services essentially reduce or control populations of pest insects and weeds in agriculture, thereby reducing the need for often costly pesticides. These services should be recognised as important although they are not quantified further in this assessment.

4.8 Tourism and recreation

International visitors to Georgia were on strong upward trend growing from approximately 5 million in 2014 to 7.73 million in 2019 (Figure 4-2). The COVID-19 pandemic resulted in a dramatic reduction to 1.5 million visitors in 2020 recovering slowly to 1.7 million in 2021 and more rapidly in 2022 with visitors projected to reach at least 4.3 million (projected based on the first nine months of 2022).

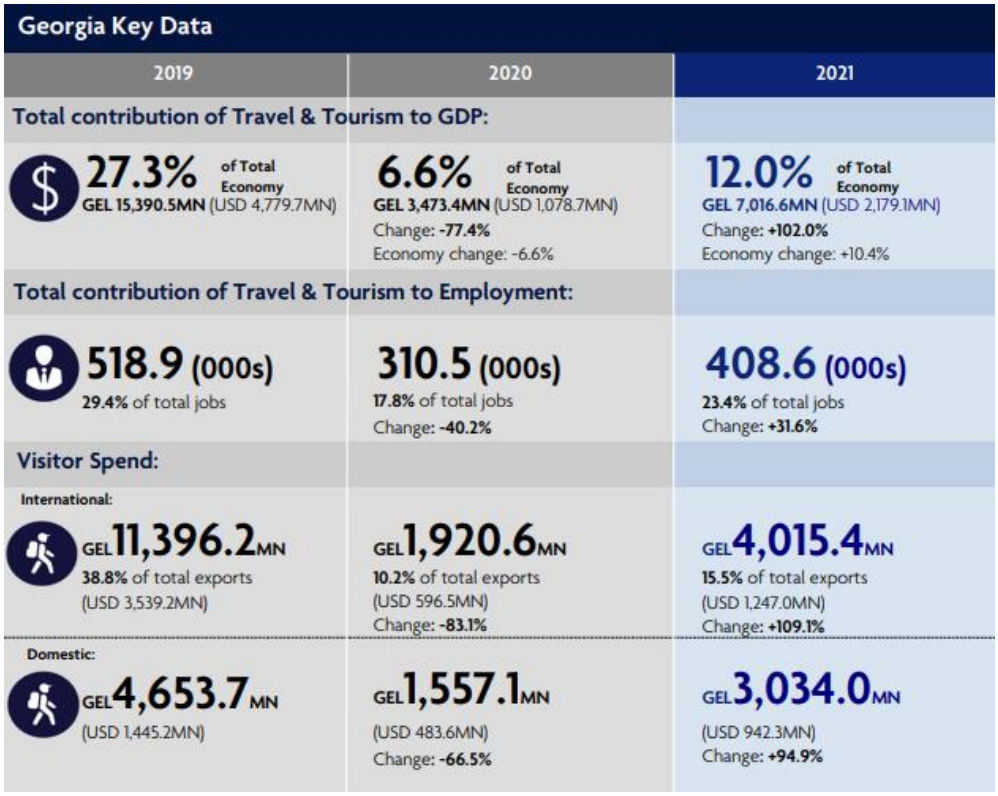
Figure 4-2: Georgia international visitor numbers and growth



Source: Data from https://gnta.ge/statistics/

The Georgian travel and tourism sector contributed over 25% of national Gross Domestic Product (GDP) in 2019 before decreasing to 6.6% and recovering substantially to 12% in 2021 (Figure 4-3). This is roughly twice the global average emphasising the important of tourism to Georgia. Tourism is also an important source of foreign exchange bringing in GEL4 billion in 2021 and supporting 408,000 direct and indirect jobs.

Figure 4-3: Tourism's contribution to the Georgian economy (2019 – 2021)



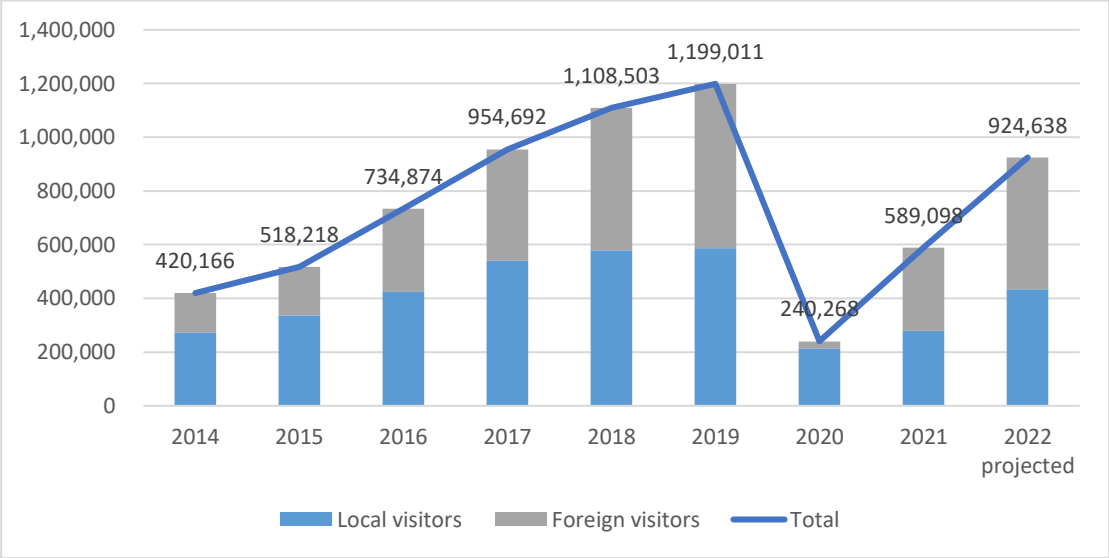
Source: WTTC (2022)

Throughout the world, attractive and well-managed protected areas make a significant contribution to economic development through tourism. They are often either prominent in the package of attractions that bring tourists and their spending power to a given area or, in many cases, they are the main tourist draw-card.

Visitor numbers to protected areas in Georgia were extremely robust between 2014 and 2019 increasing almost three-fold to 1.2 million visitors with international visitor growth making a greater contribution than local visitor growth (Figure 4-4). This level of growth was more than twice the average for all international visitors to Georgia emphasising the importance of PAs.

The COVID-19 pandemic resulted in a dramatic reduction to 240,000 visitors, most of them locals. However, the post-pandemic recovery has seen visitor numbers to PAs increase to 925,000 for 2022 (projected for the year based on data up to September). Again, this has been far more robust than the recovery of overall international visitors to Georgia. It indicates robust demand to visit PAs and significant opportunities to take advantage of increased PA tourism which will require greater investment in PAs including in their day-to-day management and in eco-tourism infrastructure.

Figure 4-4: Visitors numbers and growth for Georgian protected areas



Source: APA data

In terms of the contribution of individual protected areas to overall tourist numbers, Table 4-8 shows that smaller Natural Monuments (caves and canyons) attract the highest visitor numbers followed by larger PAs such as Kazbegi National Park, Borjomi-Kharagauli National Park and Tbilisi National Park.

Table 4-8: Visitors numbers for protected areas Administrations and individual protected areas (2018 - 2022)

Protected Areas Administration / Protected Area	2018	2019	2020	2021	2022 projected
Borjomi-Kharagauli Protected Areas (BKPA)	61 952	64 357	12 112	18 138	36 304
Vashlovani Protected Areas	12 404	10 511	1 852	4 053	3 793
Tusheti Protected Areas	14 867	16 427	7 055	12 197	16 621
Kintrishi Protected Areas	6 554	7 005	1 214	1 867	3 043
Kolkheti National Park	34 000	27 300	8 120	10 394	16 409
Lagodekhi Protected Areas	57 472	59 761	6 079	7 655	9 853
Mtirala National Park	57 770	77 264	15 424	51 128	81 206
Prometheus Cave	185 516	184 264	19 345	104 112	176 401
Sataplia Cave	81 556	74 198	13 805	36 080	97 854
Navenakhevi Cave	543	2 943	0	0	4 261
Tetra Cave				2 498	5 506
Martvili Canyon	174 143	189 894	21 489	116 420	180 886
Okatse Canyon	84 189	92 872	10 609	51 047	66 627
Kinchkha Waterfall	0	22 130	4 914	17 260	10 550
Kobuleti Protected Areas	14 325	14 185	2 811	2 908	3 896
Chachuna Managed Reserve	3 262	3 060	1 063	2 109	2 644
Javakheti Protected Areas	4 616	6 425	5 967	6 281	5 341
Machakhela National Park	10 086	11 303	800	520	805
Algeti National Park	33 248	37 758	17 110	21 753	26 441
Tbilisi National Park (excluding Dashbashi Canyon)	97 480	102 104	61 890	45 630	46 872
Dashbashi Canyon				9 426	104 417
Mariamjvari Nature Reserve	0	22	94	157	189
Kazbegi National Park	174 520	195 228	28 515	67 419	23 321
Adjameti Managed Reserve				46	5
Pshav-Khevsureti Protected Areas					1 394
Total	**1 108 503**	**1 199 011**	**240 268**	**589 098**	**924 638**

Source: APA data

To estimate the current value of tourism associated with the protected areas, visitor numbers to PAs were converted into visitor days (or parts thereof for short visits) and

multiplied by average spend of GEL 265 per visitor per day for international visitors and GEL 65 for domestic visitors based on 2021 research by EcoTone. They were found to be in the order of GEL 121 million/yr (Table 4-9).

Table 4-9: Current annual values associated with tourism in protected areas (2022)

Protected Areas Administration / Protected Area	Current annual value of tourism		
	Local tourists	Foreign tourists	Total
Borjomi-Kharagauli Protected Areas (BKPA)	1 489 715	1 141 992	2 631 708
Vashlovani Protected Areas	364 488	1 529 066	1 893 553
Tusheti Protected Areas	2 027 725	9 351 411	11 379 136
Kintrishi Protected Areas	140 311	234 396	374 706
Kolkheti National Park	711 837	1 446 356	2 158 192
Lagodekhi Protected Areas	797 417	665 647	1 463 064
Mtirala National Park	1 663 161	25 498 770	27 161 931
Prometheus Cave	1 239 563	18 319 487	19 559 050
Sataplia Cave	2 294 598	3 610 701	5 905 298
Navenakhevi Cave	125 952	51 121	177 074
Tetra Cave	97 997	330 077	428 073
Martvili Canyon	1 920 588	16 137 288	18 057 876
Okatse Canyon	608 203	6 348 521	6 956 725
Kinchkha Waterfall	145 338	805 277	950 615
Kobuleti Protected Areas	197 364	227 681	425 045
Chachuna Managed Reserve	99 025	296 962	395 987
Javakheti Protected Areas	250 762	393 101	643 863
Machakhela National Park	21 709	124 828	146 537
Algeti National Park (excluding Dashbashi Canyon)	1 672 378	188 615	1 860 994
Dashbashi Canyon	2 136 196	5 126 185	7 262 380
Tbilisi National Park	2 880 863	676 024	3 556 887
Mariamjvari Nature Reserve	12 264	-	12 264
Kazbegi National Park	1 696 678	5 442 985	7 139 663
Adjameti Managed Reserve	305	-	305
Pshav-Khevsureti Protected Areas	34 849	412 024	446 873
Total	**22 629 286**	**98 358 514**	**120 987 800**

4.9 Existence and cultural values

Protected areas are generally established in natural areas of special importance to society particularly from a biodiversity and natural beauty perspective. People thus often derive value from knowing that they exist. They also draw inspiration from such places and attach a cultural value to them particularly if they have heritage value or are used for cultural or spiritual practices.

Protecting the existence of unique species and habitats

Georgia, as a part of the Caucasus, is identified by WWF among 200 global priority ecoregions[11]. Georgia is also listed in two of the 36 'biodiversity hotspots' identified globally[12], namely the Caucasus hotspot and Iran-Anatolia hotspot.[13]

The Protected Areas of Georgia play the leading role in preserving the rich biodiversity of the country. They protect many unique habitats and species, including endemic and

[11] WWF, Global 200. https://www.worldwildlife.org/publications/global-200

[12] Conservation International. http://www.biodiversityhotspots.org

[13] Caucasus Hot Spot includes north slopes of Caucasus Range, southern part of Russian Federation (including the Dagestan, Chechnya, Ingushetia, Northern Ossetia, Kabardino-Balkaria, Karachai-Cherkesia, and Adigea Autonomous Republics), Georgia, Azerbaijan, Armenia, the northeastern part of Turkey, and a part of northwestern Iran.

threatened species. Kolkehti NP and Kobuleti PAs preserve the world's unique sphagnum peatlands. The majority of the 31 Important Bird Areas[14] identified in Georgia are designated in the protected areas; these areas host 25 globally threatened species. Many of identified Emerald sites, which protect species and habitats of Bern Convention, are designated on the protected areas. Four sites - Bughdasheni Lake, Ispani Mire, Madatapa Lake and Wetland of Central Colkheti – are designated as Wetlands of International Importance and are located within the protected areas[15]; they host rare and relict vegetation communities and support migration of globally threatened birds. In 2021, the Colchic Rainforests and Wetlands located within the boundaries of four protected areas in the West Georgia - the Kolkheti and Mtirala NPs and the Kintrishi and Kobuleti PAs – were granted the status of UNESCO World Natural Heritage Site. In 2022, two Biosphere Reserves (BR) - Three Alazani Rivers BR and Dedoplistskaro BR - were recognized by UNESCO. These BR include 12 PAs as a core and/or buffer zones, in case of Tusheti BR also as part of Traditional area.

Heritage, culture and knowledge

Protected areas in Georgia support and maintain the historical heritage, architecture, culture, traditions and knowledge of local people.

Archaeological monuments from Neolitic, Bronze Age and Ancient period are found within and adjacent to many PAs of Georgia. For example, the ruins of settlements from the early Bronze age are found in Kobuleti PAs, presenting the oldest agricultural cultural monument in Kolkheti. Archeological monuments dating from three millennia BC as well as dozens of remains of settlements from late Bronze and Ancient periods have also been found in Kolkheti NP. Burial mounds (kurgans) from the Bronze Age are found In Tabatskuri MR and Javakheti NP. Cyclopean fortresses are preserved in Borjomi-Kharagauli PAs. The arch bridge, unique to its architecture and building techniques, is presented in Kintrishi NP.[16]

Most PAs of Georgia include different historical-cultural sites such as fortresses, castles, churches, monasteries, historical settlement, tombs, etc. These date from pre-Christian times to the modern era. The combination of scenic mountain landscape and architecture make the cultural landscape of PAs such as Tusheti, Aragvi and Truso PLs unique and of immense value.

Some protected areas (e.g. Kazbegi NP, Pshav-Khevsureti PAs, Tusheti PA and Tusheti PL, Algeti NP) include sacred sites with religious meaning, where use of resources and often even entering the area is restricted or forbidden. In Khevi and Tusheti such sacred sites - “sacred forest” (shrine forest) – are next to many villages, in Khevsureti “shrine-angel places” are situated on the hills surrounded by forest. Usually on these sites there are places of worships and during the religious celebrations traditional rituals are held. (Kartvelishvili and Kakabadze 2018). Locally unique culture and traditions are preserved by local communities living within or around PAs, especially in mountain areas. Oral traditions and practices are well preserved in Tusheti PL, Aragvi PL, adjacent to Pshav-Khevsureti NP, Kazbegi NPs.

The variety of landscapes and rich biodiversity, as well as cultural and historical heritage, represent ideal locations for scientific research and education. Representatives of various scientific institutions, universities and schools have research and educational activities in many protected areas of Georgia.

The existence and cultural value or Georgian PAs are highly significant although not valued in monetary terms. Tentative and conservative estimates for existence values

[14] BirdLife International. http://datazone.birdlife.org/site/results?cty=80

[15] Ramsar. https://rsis.ramsar.org/sites/default/files/rsiswp_search/exports/Ramsar-Sites-annotated-summary-Georgia.pdf?1660918339

[16] Management Plans or respective PAs.

were nevertheless included based on studies from other countries. These include the following published sources:

Table 4-10: Ecosystem service valuation studies used to estimate local values for existence and cultural services

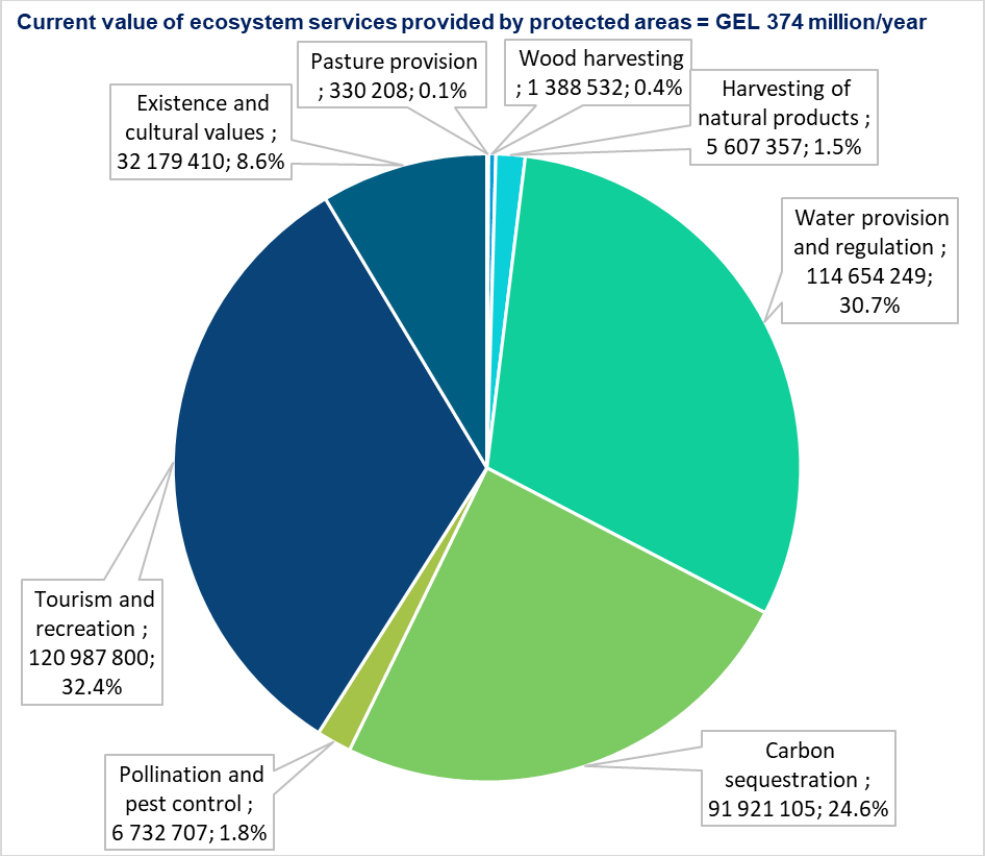
Author	Key findings
Getzner (2009)	Found that people were willing to pay €13.8 for securing the financing of national park programs in Poland.
Quintas-Soriano, et al. (2016)	Assessed several ecosystem services in Spain and estimated the average value for existence and spiritual value at EUR6.26/ha/yr. Note that this value applies to all natural areas and PA are likely to have higher values given their importance for conservation.
Curtis (2004)	Assessed the Wet Tropics World Heritage Area (WTWHA) in Australia and found that the existence values (incl aesthetic, cultural and spiritual values) from this forest area were approximately AUS$13.25/ha/yr.
Naidoo and Ricketts (2006)	Selected a conservative value of $5/ha/yr for the existence of forests in the Mbaracayu region of Malaysia based on debt-for-nature swaps for all tropical forests.
Turpie (2003)	Used a contingent valuation survey to estimate the existence value of the internationally significant fynbos shrub biome which is an IUCN hot spot located in the Western Cape region of South Africa. They found that the willingness to pay of the public for fynbos conservation was up to US$3.60/ha/yr.
Adams et al., (2008)	Focused on the Brazilian Semi-Deciduous Atlantic Rainforest which is internationally recognised as one of the most biodiverse and threatened biomes. They estimated the public's willingness to pay for the conservation of Morro do Diabo State Park and for the Atlantic Rainforest's remnants in São Paulo State as a whole was approximately US$60 ha/year.

The average for the above estimates were appropriately adjusted to local circumstances to arrive at an average value of GEL 45/ha/yr for low to medium degradation areas. Having varied per hectare values per degradation level, they were multiplied by the extent of relevant protected areas to generate a total current baseline value estimate of GEL 32 million/yr.

5 SUMMARY OF CURRENT PROTECTED AREA VALUES

The figure below provides a summary of the annual proportional contributions of each ecosystem service that could be quantified in the preceding sections. The protected areas system provides highly significant benefits to society worth in the order of at least GEL 374 million/yr (Figure 5-1). Tourism, water provision and regulation and carbon sequestration are the most prominent quantified services.

Figure 5-1: Summary of current annual baseline values associated with the protected areas network (2022)



6 COST-BENEFIT ANALYSIS OF THE INCREASED FUNDING SCENARIO

With the current values associated with PAs established, this section looks to the future and assesses the costs and benefits of the Increased Funding Scenario versus the Business as Usual (BAU) Scenario. First, additional costs are estimated based on a 2020 Finance Needs Assessment for the PA system. Then, to measure benefits, predictions are made regarding what the Scenarios are likely to mean for the value of each ecosystem service over the next 20 years. The flow of costs and benefits are then compared and analysed in a cost-benefit analysis (CBA) framework.

6.1 Protected areas funding needs

The BAU Funding Scenario leads to inadequate management. It is characterized by, for example, low salaries which make staff retention difficult, too few staff to cope with management challenges, under-investment in necessary equipment and infrastructure, limited research and monitoring and not enough capacity for more meaningful and effective community engagement.

The detail Finance Needs Assessment (FNA) carried out in 2018/19 for the Georgian PA system estimated additional annual funding needs of GEL 16.6 million for basic management (note that this amount covers the existing PAs and not PAs yet to be declared which are beyond the scope of this assessment). These additional PA management funding needs were adjusted for general inflation to GEL 21 million/yr in current terms and were used on the cost side of the cost-benefit equation. For future

years they were increased by general inflation plus annual real (i.e. above general inflation) increases of 5%/yr were applied each year after 2025 to ensure conservatism.

6.2 Ecosystem service value changes per scenario

Projecting the impact of protected area funding and future ecosystem services values or benefits is a difficult exercise which relies on several assumptions. These are discussed before presenting the results of their application per funding scenario.

6.2.1 Key assumptions used for projections

The following overall assumptions or societal trends were applied in the projection process:

- Limited or no national population growth in keeping with recent trends.
- Average household incomes will continue to rise in keeping with development trends resulting in greater interest in and ability to pay for outdoor leisure activities.
- National agricultural intensification efforts will be relatively successful resulting in increased yields from existing agricultural lands and less need for agricultural expansion for basic human needs.
- The trend towards greater urbanisation and proportionately lower rural populations and reliance on agriculture is maintained.
- Access to protected areas will continue to improve as local and international flight, road and rail network expands gradually.

Additional assumptions per ecosystem service are discussed below.

Future **pasture use, wood harvesting and NTFP harvesting** levels were based on the tentative predictions regarding future use in Table 6-1 based on discussions with APA and PA Administrations representatives. The BAU Scenario would generally result in less management capacity and over-use resulting in increased degradation. The Increased Funding Scenario would allow for substantially improved management and control thereby allowing for pasture use and harvesting to stay the same or decrease slightly to improve sustainability and enhance the value of other ecosystem services.

Table 6-1: Assumptions for the projection of future pasture use, wood harvesting and NTFP harvesting levels

Ecosystem Service	Key assumptions driving ecosystem services values for future scenarios	
	Business as Usual Funding Scenario	***Increased Funding Scenario***
Pasture use	Less ability to manage properly leads to over-use. Relative to current levels, use gradually increases over 20 years by 25% for APA PAs, 15-20% for Tusheti PL.	Better management and control of sustainable use. Relative to current levels, use gradually decreases over 20 years by 25% for APA PAs, stays the same for Tusheti PL.
Harvesting wood	Less ability to manage properly leads to over-use. Relative to current levels, use gradually increases over 20 years by 10-15% for Tusheti PL and Lagodeghi, 20-30% for Borjormi, 25% for other APA PAs.	Better management and control of sustainable use. Relative to current levels, use either stays the same or gradually decreases over 20 years by 20% for APA PAs and 15-20% for Tusheti PL.

Harvesting other natural products (NTFPs)	Less ability to manage properly leads to over-use. Relative to current levels, use gradually increases over 20 years by 10-15% for Tusheti PL, 20-25% for Lagodeghi, 15% for Borjormi, 25% for other APA PAs.	Better management and control of sustainable use. Relative to current levels, use either stays the same or gradually decreases over 20 years by 15% for APA PAs and 10% for Tusheti PL. Illegal use may decreased while controlled legal use increases.

Per hectare per year values which varied across degradation levels were assigned to **water provision and regulation, pollination and existence values** as per Table 6-2. These were used to estimate current values based on current degradation and to generate future values for these services in 20 years. Values in the intervening years (i.e. between year one and year 20) were smoothed out over time reflecting the gradual nature of value changes.

Table 6-2: Assumptions for the projection of future watershed protection, pollination, pest control and existence values

Level of degradation	**Value in GEL/ha/yr**		
	Water supply and regulation	**Pollination and pest control (for areas within 750m of PA boundaries)**	**Existence value**
Low	230	294	54
Low to medium	192	245	45
Medium	154	196	36
Medium to high	115	147	27
High	77	98	18

Future **natural disaster mitigation** values focused on landslides in Adjaran PAs were based on the findings of Brander et al. (2016) elaborated in Section 4.5.

For **carbon sequestration**, future biomass carbon stocks were estimated in 20 years based on degradation levels per scenario. Current stocks were then subtracted from these and the results were divided by 20 to arrive at an estimate of additional sequestration (or emissions) per year which could then be multiplied by the value of carbon.

To estimate future **tourism values** per funding scenario, it was necessary to make assumptions about future visitor numbers to parks. It was assumed that spending per tourist would increase normally in line with inflation. At a national level it was assumed that tourism growth to Georgia would remain robust. Table 6-3 shows the assumed future visitor numbers in 20 years based on inputs from APA tourism planners. The Increased Funding Scenario would provide the opportunity for highly significant visitor growth particularly for PAs that are less visited but nevertheless contain valuable tourism assets/attractions.

Table 6-3: Assumed future tourist visitor numbers per scenario

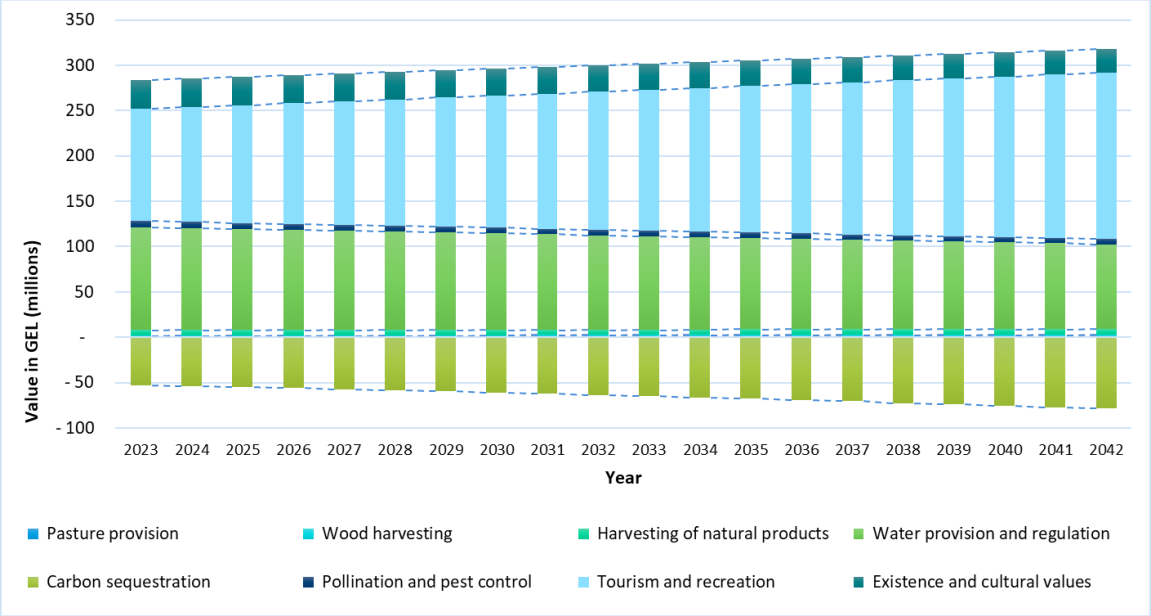
	Number of visitors

Protected Areas Administration / Protected Area	2019	2022 projected	In 20 years for Business as Usual Scenario	In 20 years for Increased Funding Scenario
Borjomi-Kharagauli Protected Areas (BKPA)	64 357	36 304	81 317	140 000
Vashlovani Protected Areas	10 511	3 793	8 495	29 079
Tusheti Protected Areas	16 427	16 621	37 229	90 000
Kintrishi Protected Areas	7 005	3 043	6 816	23 332
Kolkheti National Park	27 300	16 409	36 755	80 000
Lagodekhi Protected Areas	59 761	9 853	22 070	75 548
Mtirala National Park	77 264	81 206	181 893	300 000
Prometheus Cave	184 264	176 401	180 000	190 000
Sataplia Cave	74 198	97 854	98 000	100 000
Navenakhevi Cave	2 943	4 261	5 000	6 000
Tetra Cave		5 506	12 334	42 220
Martvili Canyon	189 894	180 886	190 000	400 000
Okatse Canyon	92 872	66 627	90 000	100 000
Kinchkha Waterfall	22 130	10 550	23 630	80 887
Kobuleti Protected Areas	14 185	3 896	8 726	29 869
Chachuna Managed Reserve	3 060	2 644	5 922	20 273
Javakheti Protected Areas	6 425	5 341	11 964	40 954
Machakhela National Park	11 303	805	1 803	6 173
Algeti National Park (except Dashbashi Canyon)	37 758	26 441	59 224	100 000
Dashbashi Canyon		104 417	233 884	300 000
Tbilisi National Park	102 104	46 872	104 988	359 386
Mariamjvari Nature Reserve	22	189	423	1 447
Kazbegi National Park	195 228	23 321	52 237	178 812
Adjameti Managed Reserve		5	200	60 000
Pshav-Khevsureti Protected Areas		1 394	3 122	200 000
Total	**1 199 011**	**924 638**	**1 456 032**	**2 953 979**

6.2.2 BAU Funding Scenario values

The figure below presents the results of the assessment of the future values associated with the protected areas system under the Business as Usual (BAU) Funding Scenario. Within 20 years, the total value of the protected areas system would decrease from its current value of at least GEL 374 million/yr to a net value of GEL 240 million/yr. Within this total, pasture provision and harvesting value associated with protected areas would increase steadily with over-use. However, the value of all other ecosystem services would decrease gradually due to increased degradation and deforestation. Water provision and regulation services would decrease, tourism growth would be constrained and protected areas would no longer sequester carbon instead becoming significant sources of carbon emissions.

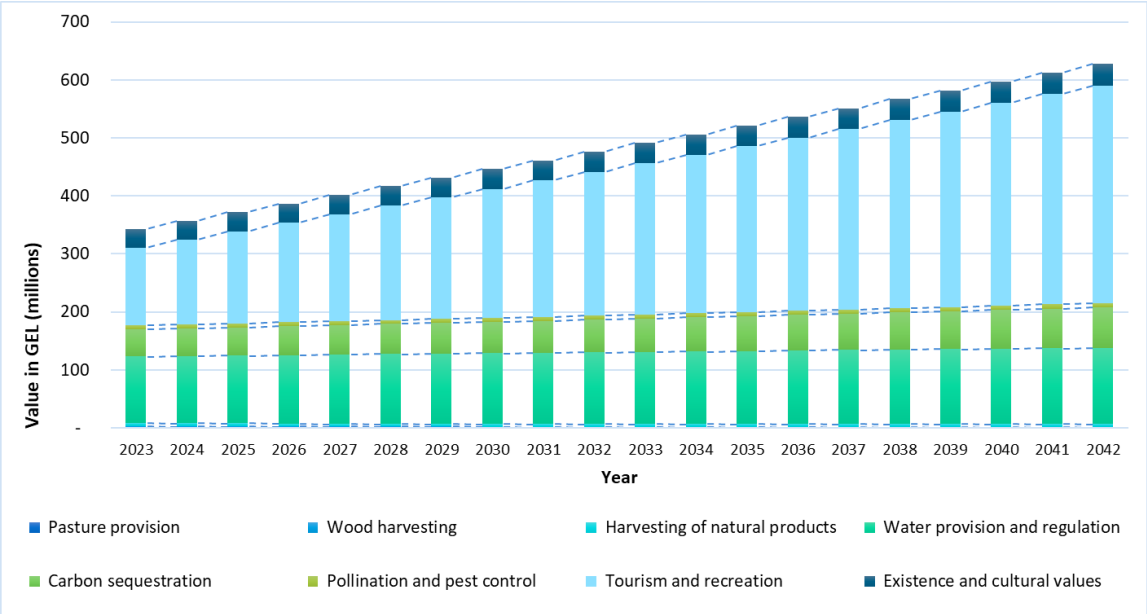
Figure 6-1: Protected area system ecosystem services values under the BAU Scenario



6.2.3 *Increased Funding Scenario values*

The figure below presents the results of the assessment of the future values associated with the protected areas system under the Increased Funding Scenario. Within 20 years, the total value of the protected areas system could increase from its current value of at least GEL 374 million/yr to a value of GEL 627 million/yr. Within this total, pasture use and harvesting would decrease thereby remaining sustainable while the value of all other ecosystem services would increase. Water provision and regulation services values be enhanced, protected areas tourism would increase substantially, carbon sequestration would improve and cultural values would be enhanced.

Figure 6-2: Protected area system ecosystem services values under the Increased Funding Scenario



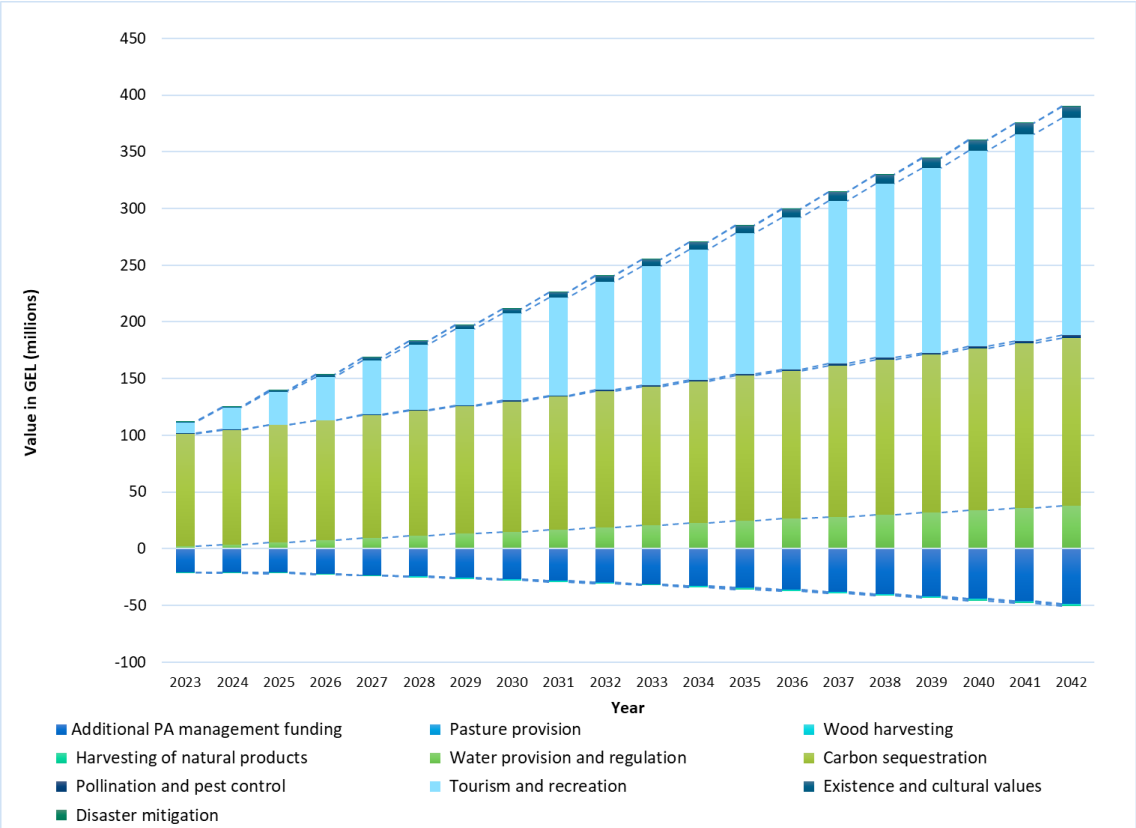
6.3 Cost-benefit analysis results

Cost-benefit analysis (CBA) focused on testing of the economic justifiability of the Increased Funding Scenario relative to the BAU Scenario. The annual flows of cost and benefit values over 20 years were converted into present value terms using appropriate discount rates. A base case discount rate of 6% was chosen as most

suitable conservative rate for Georgia and the sensitivity of results were also tested for a higher (8%) and a lower (4%) discount rate.[17] The Net Present Value (NPV) of the Increased Funding Scenario was then estimated by subtracting the present value of costs from the present value of benefits. A benefit-cost ratio was also generated, and a sensitivity analysis was conducted.

The figure below shows the additional PA manage funding and the flow of ecosystem service values for the Increased Funding Scenario minus the ecosystem service values for the BAU Scenario (i.e. the net increase/decrease in ecosystem services values due to increased funding).

Figure 6-3: Costs and benefit flows over time of the Increased Funding relative to the BAU Scenario



The NPV associated with the Increased Funding Scenario would be GEL 1.8 – 2.6 billion for the base case discount rate resulting in a Benefit: Cost Ratio of between 6: 1 and 9: 1 (Table 6-4). At an overall level, quantified benefits would therefore exceed costs by a substantial margin. Pasture use, wood harvesting and other harvesting values would be lower and at a sustainable level. These decreases would be exceeded by substantial increases in the value of all other ecosystem services. Increases in carbon sequestration along, tourism and recreation benefits and watershed services benefit would be particularly significant.

Table 6-4: Cost-benefit analysis results for Increased Funding Scenario relative to BAU Scenario

	Present Value (PV) in GEL millions at discount rate of:		
	4%	**6%**	**8%**
Additional PA management funding			
Additional PA management funding	***325 - 488***	***267 - 400***	***222 - 333***

[17] Base case rate choice drew on rate used for World Bank infrastructure projects and for assessment of wildfire reduction practices (see ELD, 2017).

Ecosystem services value changes									
Pasture provision	-2	-	-3	-2	-	-2	-1	-	-2
Wood harvesting	-2	-	-4	-2	-	-3	-2	-	-2
Harvesting of natural products	-7	-	-10	-5	-	-8	-4	-	-6
Water provision and regulation	188	-	282	148	-	223	119	-	178
Disaster mitigation	3	-	4	2	-	3	2	-	3
Carbon sequestration	1 292	-	1 939	1 077	-	1 615	910	-	1 365
Pollination and pest control	11	-	17	9	-	13	7	-	11
Tourism and recreation	958	-	1 437	756	-	1 133	604	-	906
Existence and cultural values	52	-	78	41	-	61	33	-	49
Total	***2 493***	***-***	***3 740***	***2 024***	***-***	***3 036***	***1 668***	***-***	***2 501***
Net Present Value (NPV)	***2 168***	***-***	***3 252***	***1 757***	***-***	***2 636***	***1 446***	***-***	***2 168***
Benefit: Cost Ratio (BCR)	***6***	***-***	***9***	***6***	***-***	***9***	***6***	***-***	***9***

The above results were subjected to a general sensitivity analysis in which key cost and benefit assumptions were varied. This showed that:

- Using higher or lower discount rates do not change the overall findings materially.
- Protected areas management costs would have to increase by several multiples and/or benefits would have to decrease by several multiples to change the overall net benefit outcomes.
- Carbon sequestration and tourism and represent a significant proportion of benefits. Overall results would, however, remain positive even if carbon sequestration benefits or tourism benefits are assumed to be zero.

Although this assessment focused on existing PAs, overall positive results should also be expected for investment in the expansion of the PA network.

7 ALIGNMENT WITH POLICY AND PLANNING

The policy alignments achieved by increased PA funding are worth emphasising to support the results of the cost-benefit analysis. The need to increase funding is clear in policies, strategies and plans dealing with biodiversity and protected areas such as the Fourth National Environmental Action Programme 2022 – 2026 (NEAP - 4).[18] The NEAP-4 covers all national and sectoral environmental strategic direction including for biodiversity and protected areas (also encompassing mobilizations of financial resources for biodiversity). Its overall strategic objectives are providing a clean and safe environment for human health and natural ecosystems and sustainable use of natural resources, taking into account the interests of future generations.

At an international level, the 2022 Global Biodiversity Framework (GBF) is highly relevant. It sets an ambitious target to effectively conserve and manage 30 per cent of terrestrial, inland water, coastal and marine areas through well-connected systems of protected areas and other effective area-based conservation measures by 2030 (the so-called “30x30” target). Georgia is a GBF signatory and has shown additional commitment by joining the High Ambition Coalition for Nature and People set up to

[18] Fourth National Environmental Action Programme of Georgia 2022-2026 (#1629 Decree of the Government of Georgia, 07.09.2022. https://www.matsne.gov.ge/ka/document/view/5563250?publication=0)

champion the actions needed to reach the "30x30". Chief among these actions is unprecedented increases in investment in PA management and expansion.

It should also be emphasized that increased funding is not only aligned with environmental policy but also with:

- National socio-economic development policies.
- Sector plans in water, energy, agriculture and rural development and tourism.
- Climate change, desertification and land restoration imperatives.

7.1 National socio-economic development policies

National socio-economic development is guided primarily by the national Socio-Economic Development Strategy and the National Document on Sustainable Development Goals. These highlight the need for conservation including in protected areas as follows:

- **The Socio-Economic Development Strategy of Georgia "GEORGIA 2020"**[19] defines the main directions of the socio-economic policy and sets out the socio-economic priorities for the country till 2020 (the document is valid till the next strategy is elaborated). The economic policy of Georgian Government is based on three main principles: 1. to ensure rapid and effective economic growth focused on the development of the real (production) sector of the economy; 2. to implement an economic policy promoting inclusive economic growth; 3. rational use of the natural resources, ensuring ecological safety and sustainability and avoiding natural disasters during the process of economic development.
- **The National Document on Sustainable Development Goals**[20] aims to promote implementation of SDGs and to introduce evidence-based national policy according to the 2030 agenda. The National Document equally refers to the three dimensions of sustainable development – economic, social and environmental, and represents national definition of the goals, objectives and indicators, according to which Georgia ensures national and sectoral policy planning until 2030. The National Target 15.4 is: "By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, to enhance their capacity to provide benefits which are essential for sustainable development". The National indicator is 'to cover important mountain biodiversity sites (Key Biodiversity Areas) with protected areas', with target of 40% by 2022.

Also of relevance is the **EU-Georgian Association Agreement**[21] which aims to preserve, protect, improve and rehabilitate the quality of the environment, to protect human health, sustainable utilization of natural resources and to promote measures at international level to deal with regional or global environmental problems. The Agreement emphasizes "the importance of ensuring the conservation and the sustainable use of biological diversity as a key element for the achievement of sustainable development, ...to conserve and sustainably use biological diversity, in accordance with the Convention on Biological Diversity and other relevant international instruments...".

[19] Social-economic Development Strategy of Georgia "GEORGIA 2020" (Governmental resolution #400, 17.06.2014. https://matsne.gov.ge/ka/document/view/2373855?publication=0);

[20] The Sustainable Development Goals National Document, https://sdg.gov.ge/text-page/34

[21] ASSOCIATION AGREEMENT between the European Union and the European Atomic Energy Community and their Member States, of the one part, and Georgia, of the other part (OJ L 261, 30.8.2014, p. 4)
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02014A0830(02)-20180601&from=EN

7.2 Sector plans

The links between investments in protected areas and key national sector plans are particularly prominent for the water resources, energy, agricultural and tourism sectors.

7.2.1 Water resources and energy

Water resources management in Georgia takes its lead from **the Georgian Law on Water**[22]. The Law regulates the basic legal relationships in the sphere of the water protection, study, restoration and use. One of the objectives of the law is to protect water bodies and rational use of water resources taking into account the interest of present and future generation and the principles of sustainable development. As stated in the law, that Planning of Water Protection Measures takes into account the principles of sustainable development (on the bases of the national strategies, programmes, plans) and considering Georgian legislation, including the Law on the System of Protected Areas (Article 14).

The State Policy in the Field of Energy of Georgia[23] sets the goal to improve country's energy security to ensure implementation of national interests by providing a sufficient quantity, high quality, uninterrupted supply of different types of energy at an affordable price. Ensuring protection and sustainable land use in protected areas therefore can be directly linked to supporting the achievement of water resource and associated hydropower energy policy goals.

7.2.2 Agriculture and rural development

The Agriculture and Rural Development Strategy of Georgia 2021-2027[24] **and Action Plan for 2021-2023**[25] aims to address the existing challenges in agricultural sector and to support social-economic development in rural areas. Protected areas management supports the agriculture sector. In this regard, Power (2010) observes that: "agroecosystems depend strongly on a suite of ecosystem services provided by natural ecosystems. Supporting services include genetic biodiversity for use in breeding crops and livestock, soil formation and structure, soil fertility, nutrient cycling and the provision of water. Regulating services may be provided to agriculture by pollinators and natural enemies that move into agroecosystems from natural vegetation. Natural ecosystems may also purify water and regulate its flow into agricultural systems, providing sufficient quantities at the appropriate time for plant growth."

[22] Georgian Law on Water (#936, 16.10.1997. https://matsne.gov.ge/document/view/33448?publication=26)

[23] The Main Directions of the State Policy in the Field of Energy of Georgia (Parliament Resolution #3758-IIს, 24/06/2015. https://matsne.gov.ge/document/view/2894951?publication=0)

[24] Agriculture and Rural Development Strategy of Georgia 2021-2027 (Governmental Resolution #32665, 20.12.2019. https://www.gov.ge/files/524_74660_648714_2665.pdf https://eu4georgia.eu/wp-content/uploads/Agriculture-and-Rural-Development-Strategy-of-Georgia-2021%E2%80%932027.pdf)

[25] The 2021-2023 Action Plan of Agriculture and Rural Development Strategy of Georgia 2021-2027 https://mepa.gov.ge/Ge/PublicInformation/20395

7.2.3 *Tourism*

The Tourism Development Strategy of Georgia 2025[26] is the key guiding document. Among priority activities defined in the strategy are 'respecting, protecting and presenting the natural and cultural heritage of Georgia' (priority activity 6) with sub-activities such as a) providing incentives for protected areas to improve visitor services and increase revenue from them, which will contribute to the development of local industries and the preservation of cultural/natural heritage; and b) promoting the development of cooperation between the state and the private sector; Increasing private investment in protected areas.

Eco-tourism development (including tourism in protected areas) is identified as an opportunity within the framework of the aforementioned Rural Development Strategy. Goal 2 of the strategy 'Sustainable usage of natural resources, retaining the eco-system, adaptation to climate change' sets the objective (2.2) to support ecotourism development by improving tourism infrastructure in protected areas (actions 2.2.1 and 2.2.2).

Protected areas already play a significantly role in driving tourism growth in the country. Increased funding would allow for this role to increase and allow them to provide a more compelling national tourism offering.

7.3 Climate change, reduced desertification and land restoration imperatives.

Climate change adaptation and mitigation are key policy imperatives in Georgia. Linked to this is the recognised need to combat desertification and to restore ecosystems. Increased funding of protected areas is aligned with all of these policies as follows:

- **Georgia's 2030 Climate Change Strategy and Action Plan**[27] defines ways to reach Georgia's 2030 greenhouse gas (GHG) emissions reduction targets for climate change mitigation, as set in Georgia's Updated NDC. The Goal 7 of the strategy aims to '*Increase the carbon capturing capacity of the forestry sector by 10% for 2030 compared to 2015*'. Key objectives related to the protected areas include:
    - Restoration of degraded forests (Objective 7.1);
    - Supporting sustainable forest management (Objective 7.2) including through protection and/or sustainable management of forests under newly established protected areas (Activities 7.2.5);
    - Development of forest management system adequate to climate change (Objective 7.3) including through climate change mitigation measures in the protected areas management plans (Activity 7.3.1).

[26] Tourism Strategy of Georgia 2025 (https://gnta.ge/ge/publication/%E1%83%A1%E1%83%90%E1%83%A5%E1%83%90%E1%83%A0%E1%83%97%E1%83%95%E1%83%94%E1%83%9A%E1%83%9D%E1%83%A1-%E1%83%A2%E1%83%A3%E1%83%A0%E1%83%98%E1%83%96%E1%83%9B%E1%83%98%E1%83%A1-%E1%83%A1%E1%83%A2%E1%83%A0/);

[27] Resolution N167 of the Government of Georgia on approval of the Updated Nationally Determined Contribution (NDC) to the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC), Georgia's 2030 Climate Change Strategy and 2021-2023 Action Plan, 08.04.2021

- **Second National Action Programme (NAP) to Combat Desertification (2014-2022)**[28] defines its future vision as: the need in awareness of stakeholders and general public on protection and sustainable use of land resources, and integration of Sustainable Land Management technologies in the national wide economic development and ensuring well-being of the population.
- In 2015 the Ministry of Environment and Natural Resources Protection of Georgia submitted the letter to the UNCCD secretary expressing readiness of the country to participate in the **Land Degradation Neutrality Target Setting Programme** (LDN TSP) [29] and setting national targets to be reached by 2030. One of the five targets refers protected areas, stating: By 2030, protected areas coverage should reach 12%.

8 OWN REVENUES AND FINANCIAL SELF-RELIANCE

The economic case for increased government and donor funding of protected areas is clear from the results of the cost-benefit analysis and given its alignment with key national policies and plans. It should also be emphasised that PA management authorities like APA are not simply awaiting government and donor funding. They are actively and successfully increasing their own revenue generation and associated ability to be more self-funding.

APA receives funding from the following sources:

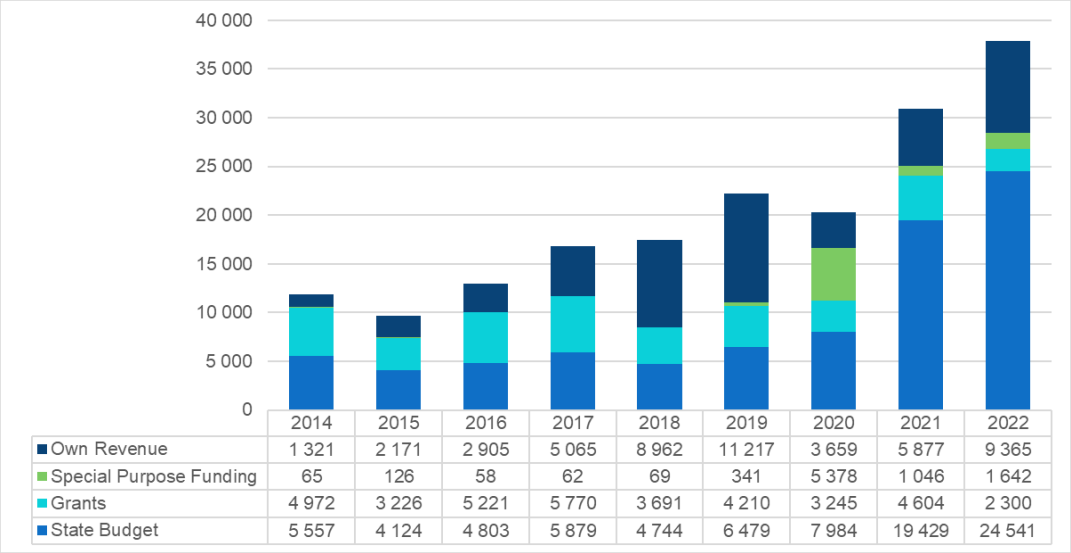
- State budget
- Own revenues
- Grants mostly from donors such as CNF, UNDP and KfW
- Special purpose funding (a form of grant funding)

Figure 8-1 shows annual revenue/funding amounts over the last eight years. Own revenue grew very strongly from GEL 1.3 million in 2014 to GEL 11.2 million in 2019 (50% of total revenue). The Covid-19 pandemic then reduced own revenue by two thirds to GEL 3.7 million in 2020 after which it gradually recovered and by the end of 2022 is projected to reach GEL 9.4 million (25% of total revenue). State budget allocations have also grown from GEL 5.6 million to GEL 24.5 million (65% of total revenue) in 2022. Grant revenue has decreased from GEL 5 million to GEL 2.3 million (6% of total revenue) in 2022.

Figure 8-1: APA annual funding per category in GEL '000

[28] Second National Action Programme (NAP) to Combat Desertification (Governmental decree #742, 29.12.2014. https://matsne.gov.ge/ka/document/view/2663271?publication=0 , geo171446.pdf (fao.org))

[29] The Land Degradation Neutrality Target Setting Programme (2018). https://knowledge.unccd.int/sites/default/files/ldn_targets/2018-11/Georgia%20LDN%20TSP%20Country%20Report.pdf



	2014	2015	2016	2017	2018	2019	2020	2021	2022
Own Revenue	1 321	2 171	2 905	5 065	8 962	11 217	3 659	5 877	9 365
Special Purpose Funding	65	126	58	62	69	341	5 378	1 046	1 642
Grants	4 972	3 226	5 221	5 770	3 691	4 210	3 245	4 604	2 300
State Budget	5 557	4 124	4 803	5 879	4 744	6 479	7 984	19 429	24 541

APA's own revenues are relatively diverse and include revenue from:

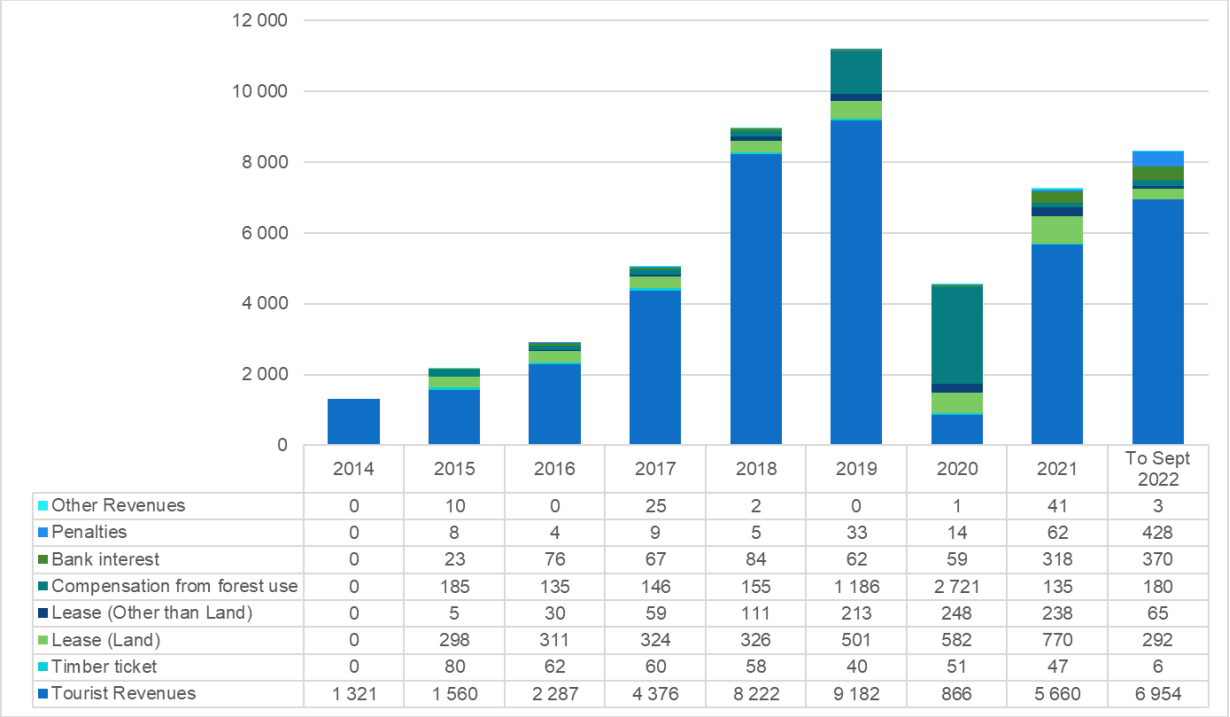
- Tourism services such entrance fees, accommodation and tours
- Timber tickets for selective wood cutting
- Leases (of land), for example, for use as pasture
- Leases (other than land), for example, for mobile phone tower operators
- Compensation from forest use (damages compensation payments)
- Bank interest
- Penalties
- Other Revenues

Own revenues are dominated by tourism revenues which peaked at GEL 9.2 million in 2019. Post-pandemic they recovered to reach GEL 6 million for 2022 up to end September 2022. Other own revenues up to end September 2022 include penalties/fines (GEL 0.43 million), bank interest (GEL 0.37 million), land leases including for pasture (GEL 290,000), compensation from forest use, other leases, sale of timber tickets, and other revenues (see Figure 8-2).

Tourism revenue sources are diverse when compared to most other countries and include:

- Entrance fees
- Tours (e.g. boat, kayak and safari)
- Accommodation (shelter, hotel, bungalow) and camp site fees
- Picnic areas fees
- Sport fishing fees
- Horse service
- Zip line and adventure park fees
- VIP tourist service
- Hiring out equipment (e.g. for camping, activities) and facilities (e.g. conference hall hire)
- Sale of goods (e.g. brochures, maps)
- Civil marriage signing ceremony
- Other

Figure 8-2: APA own revenues per category in GEL '000



	2014	2015	2016	2017	2018	2019	2020	2021	To Sept 2022
Other Revenues	0	10	0	25	2	0	1	41	3
Penalties	0	8	4	9	5	33	14	62	428
Bank interest	0	23	76	67	84	62	59	318	370
Compensation from forest use	0	185	135	146	155	1 186	2 721	135	180
Lease (Other than Land)	0	5	30	59	111	213	248	238	65
Lease (Land)	0	298	311	324	326	501	582	770	292
Timber ticket	0	80	62	60	58	40	51	47	6
Tourist Revenues	1 321	1 560	2 287	4 376	8 222	9 182	866	5 660	6 954

Tourism revenue is dominated by entrance fees which are charged at six PAs and generate almost 80% of total tourist revenue between 2015 and 2019. Other key sources include tours which generated 13% of revenue and accommodation which generated almost 2%. Tourism revenues are unevenly distributed across PAs as is the case in most countries. They were highest from Prometheus Cave, Martvili Canyon, Okatse Waterfall and Sataplia which are all Natural Monuments and collectively generated 94% of all tourism revenue between 2015 and 2019 (Table 8-1). This is largely a reflection of relatively higher visitor numbers (see Section 4.8) paying entrance fees at these PAs.

Table 8-1: Tourism revenue per PA

Protected Areas Administration / Protected Area	2015	2016	2017	2018	2019	Total	%
Prometheus Cave	866 831	1 000 703	1 855 431	3 667 698	3 689 518	**11 080 181**	43.24%
Martvili Canyon		311 118	1 253 099	2 511 108	2 883 390	**6 958 716**	27.16%
Sataplia Cave	363 421	416 827	490 654	798 105	781 752	**2 850 759**	11.12%
Okatse Waterfall	189 165	343 494	529 479	933 319	1 137 555	**3 133 012**	12.23%
Borjomi-Kharagauli Protected Areas	35 855	47 492	53 403	76 598	85 062	**298 410**	1.16%
Vashlovani Protected Areas	32 157	50 041	59 502	66 189	94 242	**302 131**	1.18%
Kolkheti National Park	24 706	43 826	52 972	71 975	112 028	**305 506**	1.19%
Kinchkha Waterfall					260 918	**260 918**	1.02%
Lagodekhi Protected Areas	22 193	34 972	37 994	54 253	54 903	**204 315**	0.80%
Mtirala National Park	7 977	19 414	26 640	24 825	35 336	**114 192**	0.45%
Javakheti Protected Areas	12 800	8 222	10 240	8 934	6 899	**47 095**	0.18%
Navenakhevi Cave				670	20 231	**20 901**	0.08%
Chachuna Managed Reserve	285	5 459	2 700	3 785	4 810	**17 039**	0.07%
Tusheti Protected Areas	1 576	2 013	2 567	2 302	1 107	**9 565**	0.04%
Algeti National Park					11 945	**11 945**	0.05%
Kobuleti Protected Areas	2 399	1 705	215	87	170	**4 576**	0.02%
Kintrishi Protected Areas	878	1 563	821	1 715	1 205	**6 182**	0.02%
Machakhela National Park					320	**320**	0.00%

Korugi and Iori Managed Reserves					110	**110**	0.00%
Total	**1 560 243**	**2 286 849**	**4 375 717**	**8 221 562**	**9 181 500**	**25 625 871**	100%

APA and the other protected area management authorities continue to actively look for ways to increase and diversify own revenues. They are assisted by their partners including through the GEF/UNDP Enhancing Financial Sustainability of the Protected Areas System in Georgia Project which included a Finance Opportunity Analysis to identify the most promising potential sources of increased revenue. Some of these are being investigated further with a view to piloting or implementation including:

- Feasibility study of the introduction of entrance fees for Mtirala, Machakhela and Kintrishi National Parks.
- Feasibility study for a Business Services Yard (BSY) for the sorting, storage and sale of wood at Nedzvi Managed Reserve. This will assist with understanding the income potential of a BSY at the site and provide guidance on financial and management models for BSYs at other PAs.
- Feasibility study for the introduction of a local eco-tourism levy for Tusheti Protected Landscape.

In addition, feasibility studies for increased tourism income generation have been conducted recently for selected PAs including Mtirala and Machakhela National Parks with additional studies in process for Borjomi-Kharagauli National Park and Javakheti Protected Areas. Increasing pasture fee revenue is also anticipated through additional leases in areas where sustainable pasture use is appropriate. The private sector should further increase its important role in creating businesses that rely on PAs and by funding conservation directly or indirectly, for example, through paying for ecosystem services and compensating for damages.

Continued own revenue growth should be achievable but only with support from government and donors. In keeping with basic business principles, it takes investment in facilities, infrastructure and management capacity in order to maintain and grow revenues (as the saying goes, ‘it takes money to make money’).

Improvements in own revenues should be welcomed. However, there is also likely to be a limit to the own revenue growth potential of PAs without compromising sustainable biodiversity conservation which remains the primary purpose of protected areas. Indeed, the overwhelming majority of protected area management authorities worldwide achieve partial financial self-reliance. This should also not be surprising as it is generally only feasible to monetise some of the significant public goods that protected areas provide mostly in the form of various ecosystem services.

9 CONCLUSIONS

Protected areas currently make a significant contribution to socio-economic development in Georgia through the ecosystem services that they provide. These services have an estimated value of at least GEL 374 million/yr and include pasture provision, wood and other harvesting, water provision and regulation, natural disaster mitigation, carbon sequestration, pollination, tourism and recreation, and cultural services. Nevertheless, protected areas generally remain under-valued by society and their contribution can certainly be enhanced.

Funding for protected areas needs to increase by more than double so that management authorities can carry out their basic management mandate. A cost-

benefit analysis (CBA) over 20 years focused on testing the economic justifiability of such an Increased Funding Scenario relative to the Business as Usual (BAU) Scenario yielded highly positive results. For the base case, the net present value (NPV) associated with the Increased Funding Scenario would be GEL 1.8 – 2.6 billion and have a Benefit: Cost Ratio of between 6: 1 and 9: 1. Results remain favourable under sensitivity analysis including extreme adjustments such as reducing carbon sequestration or tourism benefit to zero. Although this assessment focused on existing PAs, overall positive results should also be expected for investment in the expansion of the PA network.

The strong economic rationale for significantly increased funding of protected areas management is complemented by a strong policy rationale. Increased funding would support overall national socio-economic development objectives particularly in rural areas and contribute to the key sectors including the water resources, energy, agriculture and tourism sectors. It would also support climate change adaptation and mitigation along with reduced desertification and land restoration goals.

Protected area management authorities are not simply awaiting funding. They are actively and successfully increasing their own revenue generation and associated ability to be more financially self-reliant. Continued strong own revenue growth, in partnership with the private sector and communities, is achievable but only with support from government and donors - in keeping with basic business principles, it takes investment to maintain and grow revenues. International experience shows that unrealistic expectations of financial self-reliance should, however, be avoided. There is generally a limit to own revenue generation without compromising sustainable biodiversity conservation which remain the primary purpose of protected areas.

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- Ordinance of the Government of Georgia on Approval of Javakheti PAs Management Plan (#378, 26.07.2021);
- Ordinance of the Government of Georgia on Approval of Kintrishi PAs Management Plan (#197, 28.04.2021);

11 APPENDICES

Appendix 1: Current and potential future degradation levels per protected area

Name of Administration	Name of PA	Current overall level of degradation	Future level of degradation in approximately 20 years:	
			Business as Usual (BAU) allowing for further degradation	Increased Funding allowing for improved management
Kolkheti NP	a. Kolkheti NP	2	4	2
	b. Katsoburi MR	3	4	2
	c. Quercus Pontica MR	1	1	1
Kobuleti PAs	a. Kobuleti SNR	1	4	1
	b. Kobuleti MR	3	3	2
Mtirala NP	Mtirala NP	2	3	1
Kintrishi PAs	a. Kintrishi SNR	1	3	1
	b. Kintrishi NP	2	3	1
Machakhena NP	Machakhela NP	2	3	1
Samegrelo and Okatse NM	a. Okatse Canyon NM	1	1	1
	b. Okatse Waterfall NM	1	1	1
	c. Balda Canyon NM	2	2	1
	d. Oniore Waterfall & 1st Toba Cave NM	2	2	2
	e. Toba waterfall & Arsen Ocrojavashvili Cave NM	2	2	2
	f. Jortsku Cave NM	1	1	1
	g. Ochkhomuri Waterfall NM	1	1	1
	h. Nazodelao Cave NM	1	2	1
	i. River Abasha Waterfall NM	2	2	2
	j. Martvili Canyon NM	2	2	2
Imereti Caves PAs	a. Sataplia SNR	1	2	1
	b. Sataplia MR	1	2	1
	c. Prometheus Karst Cave NM	2	2	1
	d. Tetri Mgvime Karst Cave NM	2	2	1
	e. Khomuli Karst Cave NM	2	2	1
	f. Tsutskvati Karst Cave NM	2	2	1
	g. Navenakhevi Karst Cave NM	2	2	1
	h. Iazoni Karst Cave NM	2	2	1
	i. Sakajia Karst Cave NM	2	2	1
	j. Tskaltsiteli Ravine NM	1	2	1
	k. Gabzaruli Lake NM	1	2	1
	l. Satsurblia Cave NM	2	2	1
	m. Solcota Cave NM	1	1	1
	n. Didghele Cave NM	1	1	1
	o. Melouri Cave NM	1	1	1
	p. Bgheri Cave NM	1	1	1
	q. Ghliana Cave NM	1	1	1
	r. Mukhuri Waterfall NM	1	1	1
Ajameti MR	Ajameti MR	3	4	2
Borjomi-Kharagauli NP	a. Borjomi SNR	2	2	1
	b. Borjomi NP	3	3	2
	c. Nedzvi MR	3	4	2
	d. Ktsia-Tabatskuri MR	3	3	2
	e. Goderdzei Petrified forest NM	2	3	2
Javakheti PAs	a. Javakheti NP	3	2	2
	b. Tetrobi MR	1	1	1
	c. Kartsakhi bog MR	2	2	2

	d. Sulda bog MR	2	2	2
	e. Khanchali Lake MR	3	2	2
	f. Bughdasheni Lake MR	1	1	1
	g. Madatapha Lake MR	2	3	2
	h. Paravani Lake MR	1	1	1
	i. Sagamo Lake MR	1	1	1
	g. Abuli Lake MR	4	4	3
Algeti NP	a. Algeti NP	2	2	2
	b. Dashbashi Canyo NM	3	3	3
	c. Birtvisi NM	1	1	2
	d. Samshvilde Canyon NM	1	2	1
Tbilisi NP	a. Tbilisi NP	2	3	1
	c. Gardabani MR	1	1	1
	D. Bodorna Rock Collumns NM	1	2	1
Batsara-Babaneuri PAs	a. Batsara SNR	1	3	1
	b. Babaneuri SNR	1	3	1
	c. Ilto MR	1	3	1
Tusheti PAs	a. Tusheti SNR	1	3	1
	b. Tusheti NP	1	3	1
Tusheti PL	c. Tusheti PL	2	3	1
Kazbegi NP	a. Kazbegi NP	2	3	1
	b. Sakhiznari Cliff NM	1	2	1
	c. Abano Mineral Lake NM	1	3	1
	d. Truso Travertine NM	2	4	1
	e. Jvari Pass Ttravertine NM	2	3	1
	f. Keterisi Mineral Vocluse NM	1	4	1
Lagodekhi PAs	a. Lagodekhi SNR	1	2	1
	b. Lagodekhi MR	3	4	2
Pshav-Khevsureti PAs	a. Pshav-Khevsureti NP	2	2	1
	b. Asa MR	1	1	1
	c. Roshka NM	1	2	1
Chachuna MR	Chachuna MR	4	5	2
Mariamjvari NR	a. Mariamjvari SNR	1	1	1
	b. Korugi MR	2	3	1
	c. Iori MR	2	4	1
	d. Tsiv-Gombori MR	2	3	1
Vashlovani PAs	a. Vashlovani SNR	1	1	1
	b. Vashlovani NP	2	3	1
	c. Alazani flood plain forest NM	1	1	1
	d. Takhti-Tefa NM	1	1	1
	e. Artsivi Canyon NM	1	1	1

Appendix 2: List of Georgian protected areas per category showing their administration, size in hectare and main regional location

Nr	Protected Area Name and Category	Area (ha)	Region	Protected area administration
1	Kintrishi State Nature Reserve	3 108.00	Adjara	Kintrishi Protected Areas Administration
2	Liaxvi State Nature Reserve	6 388.00	South Osetia	
3	Sataplia State Nature Reserve	330.00	Imereti	Imereti Caves Protected Area Administration
4	Mariamjvari State Nature Reserve	1 022.50	Kakheti	Mariamjvari Nature Reserve Administration
5	Tusheti State Nature Reserve	10 275.00	Kakheti	Tusheti Pritected Area Administration
6	Batsara State Nature Reserve	3 036.00	Kakheti	Batsara-Babaneuri Protected Area Administration
7	Babaneuri State Nature Reserve	834.00	Kakheti	Batsara-Babaneuri Protected Area Administration
8	Lagodekhi State Nature Reserve	19 755.00	Kakheti	Lagodekhi Protected Area Administration
9	Vashlovani State Nature Reserve	9 962.00	Kakheti	Vashlovani Protected Area Administration
10	Borjomi State Nature Reserve	13 168.60	Samtskhe-javakheti	Borjomi-Kharagauli Protected Area Administration
11	Kobuleti State Nature Reserve	316.40	Adjara	Kobuleti Protected Area Administration
12	Bichvinta-Miusera State Nature Reserve	3 645.00	Abkhazia	
13	Rtsa State Nature Reserve	16 289.00	Abkhazia	
14	Pskhu-Gumista State Nature Reserve	40 819.00	Abkhazia	
Total	**Nature Reserves Area (ha)**	**128 948.50**		
Total	**Nature Reserves Number**	**14**		
1	Borjomi-Kharagauli National Park	64 756.00	Imereti, samtskhe-javakheti	Borjomi-Kharagauli Protected Area Administration
2	Kolkheti National Park	44 308.50	Samegrelo	Kolkheti National Park Administration
3	Tusheti National Park	71 341.00	Kakheti	Tusheti National Park ion
4	Vashlovani National Park	25 021.00	Kakheti	Vashlovani Protected Area Administration
5	Mtirala National Park	15 698.80	Adjara	Mtirala National Park Administration
6	Algeti National Park	8 768.00	Kvemo Kartli	Algeti National Park Administration
7	Kazbegi National Park	78 204.00	Mtskheta-Mtianeti	Kazbegi National Park Administration
8	Tbilsi National Park	21 030.81	Mtskheta-Mtianeti	Tbilsi National Park Administration
9	Javakheti National Park	13 498.02	Samtskhe-javakheti	Javakheti Protected Area Administration
10	Machakhela National Park	7 333.18	Adjara	Machakhela National Park Administration
11	Pshav-Khevsureti	73 765.00	Mtskheta-Mtianeti	Pshav-Khevsureti Protected Area Administration
12	Kintrishi National Park	10 406.00	Adjara	Kintrishi Protected Area Administration
13	Erusheti National Park	11 385.00		
Total	**National parks Area (ha)**	**445 515.31**		
Total	**National parks Area Number**	**13**		
1	Lagodekhi Managed Nature Reserve	4 500.00	Kakheti	Lagodekhi Protected Area Administration
2	Ilto Managed Nature Reserve	7 591.00	Kakheti	Batsara-Babaneuri Protected Area Administration
3	Korugi Managed Nature Reserve	1 716.00	Kakheti	Mariamjvari Nature Reserve Administration
4	Gardabani Managed Nature Reserve	3 733.70	Kvemo Kartli	Tbilsi National Park Administration
5	Iori Managed Nature Reserve	2 126.80	Kakheti	Mariamjvari Nature Reserve Administration
6	Chachuna Managed Nature Reserve	5 032.00	Kakheti	Chachuna Managed Reserve Administration
7	Kacoburi Managed Nature Reserve	270.80	Samegrelo	Kolkheti National Park Administration
8	Kobuleti Managed Nature Reserve	466.30	Adjara	Kobuleti Protected Area Administration
9	Nedzvi Managed Nature Reserve	9 212.50	Kakheti	Borjomi-Kharagauli Protected Area Administration
10	Ktsia-Tabatskuri Managed Nature Reserve	20 476.00	Samtskhe-javakheti	Borjomi-Kharagauli Protected Area Administration
11	Tetrobi Managed Nature Reserve	3 089.00	Samtskhe-javakheti	Javakheti Protected Area Administration
12	Ajameti Managed Nature Reserve	4 990.57	Imereti	Ajameti Managed Reserve Administration
13	Kartsakhi Managed Reserve	157.50	Samtskhe-javakheti	Javakheti Protected Area Administration
14	Sulda Managed Reserve	309.30	Samtskhe-javakheti	Javakheti Protected Area Administration
15	Khanchali Managed Reserve	727.30	Samtskhe-javakheti	Javakheti Protected Area Administration

16	Bughdasheni Managed Reserve	119.30	Samtskhe-javakheti	Javakheti Protected Area Administration
17	Madatafa Managed Reserve	1 398.00	Samtskhe-javakheti	Javakheti Protected Area Administration
18	Sataplia Managed Reserve	34.00	Imereti	Imereti Caves Protected Area Administration
19	Asa Managed reserve	3 943.00	Mtskheta-Mtianeti	Pshav-Khevsureti Protected Area Administration
20	Quercus Pontica Managed reserve	443.00	Guria	Kolkheti National Park Administration
21	Paravani Lake Managed reserve	4 031.00	Samtskhe-javakheti	Javakheti Protected Area Administration
22	Sagamo Lake Managed reserve	629.00	Samtskhe-javakheti	Javakheti Protected Area Administration
23	Abuli Lake Managed reserve	211.00	Samtskhe-javakheti	Javakheti Protected Area Administration
24	Tsiv-Gombori Managed Reserve	4 936.00	Kakheti	Mariamjvari Nature Reserve Administration
Total	**Managed reserves Area (ha)**	**80 143.07**		
Total	**Managed reserves Number**	**24**		
1	Alazani flood plane forests Natural Monument	201.00	Kakheti	Vashlovani Protected Area Administration
2	Takhti-Tefa Natural Monument	10.00	Kakheti	Vashlovani Protected Area Administration
3	Egle canyon Natural Monument	98.00	Kakheti	Vashlovani Protected Area Administration
4	Prometheus Karst Cave Natural Monument	46.60	Imereti	Imereti Caves Protected Area Administration
5	Tetri mgvime Karst Cave Natural Monumant	0.50	Imereti	Imereti Caves Protected Area Administration
6	Khomuli Karst Cave Natural Monument	0.30	Imereti	Imereti Caves Protected Area Administration
7	Tsutskvati Karst Cave Natural Monument	8.50	Imereti	Imereti Caves Protected Area Administration
8	Navenakhevi Karst Cave Natural Monument	1.00	Imereti	Imereti Caves Protected Area Administration
9	Iazoni Karst Cave Natural Monument	0.20	Imereti	Imereti Caves Protected Area Administration
10	Sakajia Karst Cave Natural Monument	0.03	Imereti	Imereti Caves Protected Area Administration
11	Tskaltsitela Ravine Natural Monument	12.00	Imereti	Imereti Caves Protected Area Administration
12	Okatse Canyon Natural Monument	73.00	Imereti	Samegrelo and Okatse Natural Monuments Administration
13	Okatse Waterfall Natural Monument	28.70	Imereti	Samegrelo and Okatse Natural Monuments Administration
14	Cracked lake Natural Monument	0.20	Imereti	Imereti Caves Protected Area Administration
15	Satsurblia Cave Natural Monument	0.40	Imereti	Imereti Caves Protected Area Administration
16	Solkota Cave Natural Monument	0.03	Imereti	Imereti Caves Protected Area Administration
17	Didghele Cave Natural Monument	0.20	Imereti	Imereti Caves Protected Area Administration
18	Melouri Cave Natural Monument	0.07	Imereti	Imereti Caves Protected Area Administration
19	Bgheri Cave Natural Monument	0.04	Imereti	Imereti Caves Protected Area Administration
20	Ghliana Cave Natural Monument	0.01	Imereti	Imereti Caves Protected Area Administration
21	Natural Monument of Sakhizari cliff	335.70	Mtskheta-Mtianeti	Kazbegi National Park Administration
22	Natural Monument of Abano Mineral Lake	0.04	Mtskheta-Mtianeti	Kazbegi National Park Administration
23	Natural Monument of Travertine of Truso	4.20	Mtskheta-Mtianeti	Kazbegi National Park Administration
24	Balda Canyon Natural Monument	8.40	Samegrelo	Samegrelo and Okatse Natural Monuments Administration
25	Oniore Waterfall and The First Cave of Toba	96.80	Samegrelo	Samegrelo and Okatse Natural Monuments Administration
26	Toba Waterfall and Arsen Okrojanashvili Cave Natural Monument	67.60	Samegrelo	Samegrelo and Okatse Natural Monuments Administration
27	Jortsku Cave Natural Monument	0.08	Samegrelo	Samegrelo and Okatse Natural Monuments Administration
28	Ochkhomuri Cave Natural Monument	0.50	Samegrelo	Samegrelo and Okatse Natural Monuments Administration
29	Nazodelao Cave Natural Monument	7.40	Samegrelo	Samegrelo and Okatse Natural Monuments Administration
30	River Abasha Waterfall Natural Monument	91.00	Samegrelo	Samegrelo and Okatse Natural Monuments Administration
31	Martvilis Canyon Natural Monument	13.49	Samegrelo	Samegrelo and Okatse Natural Monuments Administration
32	Goderdzi Petrified Forest Natural Monument	36.00	Samtskhe-javakheti	Borjomi-Kharagauli Protected Area Administration

33	Dashbashi Canyon Natural Monument	538.00	Kvemo Kartli	Algeti National Park Administration
34	Samshvilde Canyon Natural Monument	405.00	Kvemo Kartli	Algeti National Park Administration
35	Mukhuri Waterfall Natural Monument	4.30	Imereti	Imereti Caves Protected Area Administration
36	Bodorna Rock Columns Natural Monument	19.60	Mtskheta-Mtianeti	Tbilisi National Park Administration
37	Jvary Pass Travertine Natural Monument	2.70	Mtskheta-Mtianeti	Kazbegi National Park Administration
38	Keterisi Muneral Vocluse Natural Monument	1.00	Mtskheta-Mtianeti	Kazbegi National Park Administration
39	Roshka Natural Monument	110.00	Mtskheta-Mtianeti	Pshav-Khevsureti Protected Area Administration
40	Birtvisi Natural Monument	514.00	Kvemo Kartli	Algeti National Park Administration
Total	**Natural Monument Area (ha)**	**2 736.59**		
Total	**Natural Monument Number**	**40**		
1	Tusheti Protected Landscape	32 035.00	Kakheti	Tusheti Protected Area Administration
2	Truso Gorge Protected Landscape	7 007.00	Mtskheta-Mtianeti	Truso Gorge Protected Area Administration
3	Aragvi Protected Landscape	99 802.00	Mtskheta-Mtianeti	Aragvi Protected Area Administration
Total	**Protected Landscape Area (ha)**	**138 844.00**		
Total	**Protected Landscape Number**	**3**		
	All Protected Areas			
Total	**Area (ha)**	**796 187.47**		
Total	**Number**	**94**		
	% of country	**11.42**		