GNI plus

THE GLOBAL NDC IMPLEMENTATION PARTNERS

Mount Elgon Payments for Ecosystem Services Scoping Study

Technical Report

February 2022

AECOM

Authors

This report was funded by International Climate Initiative (IKI) and was developed by AECOM under the Global NDC Implementation Partners (GNI^{plus}) project. It was authored by Erin Gianferrara, Petrina Rowcroft, Jess Wood, Antje Lang, with contributions from Lilly Kipchumba, George Hubbard, Nikita Sobolev, Maisie Lemon-Smith, and Sophia Burke (AmbioTEK).

The authors would like to thank and acknowledge the inputs from Steven Smith, Emily Le Cornu, and Renard Teipelke for their advice and internal review. Including: Pollination, one of the other partners of GNI^{plus} and Clarice Wambua from Kieti Advocates who undertook the legal and policy analysis; as well as Dr Emmanuel Ndiema from National Museums of Kenya and the team from the Mount Elgon Elephant Project (MEEP) Zeke Davidson, Chris Powles, Lizbeth Mate, Clarine Kigoli and the scouts who supported with the technical review, stakeholder engagement and the ground truthing of findings.

We are grateful for guidance received during the stakeholder consultation phase and the external reviews that were undertaken in October and December 2021 that helped shape the end publication: Aggrey Chemonges (CEC, Trans-Nzoia County), Catherine Wambani (KWS), Isaac Mutanyi (WRA), Stanley Ambasa (NEMA), Moses Soet (Bungoma County), Stephen Wamalwa Makhanu (Bungoma County), George Otieno Wara (KFS), Elly Otirno Tinda (KFS), JOHN Mugunyi (KFS), Dianah M Kavagi (Trans-Nzoia County), Yona Okoko (Trans-Nzoia County), Geoffrey Mwachala (NMK), Joyce Ruthi (NMK), Abdalla Kisiwa (Kenya Forest Research Institute), Jacqueline Nduta Kariithi (Elkoony Center), Philip Chepso Towett (Mt. Elgon Guides), Florence Mugi (TNC), Monica Nderitu (VI World Agroforestry Foundation), Anne Tek (EAWLS), James Mathenge (KWS), Annah Mutinda (State Department For Cooperatives/FAO), James Mwang'ombe (KFS), George Abuto (KFS), Anthony Macharia (KEFRI), Jonah Kipsaat Kiprop (KEFRI), Richard Kaguamba (FAO), Philip Kisoyan (FAO) and Benjaminphilippe Deridder (FAO).

Report citation: AECOM (2022). Mount Elgon Payments for Ecosystem Services Scoping Study: Technical Report.

Front cover photo credit: Petrina Rowcroft.

About GNI^{plus}

This report has been delivered under the Global NDC Implementation Partners (GNI^{plus}) project being implemented in Kenya. It is a three-year project funded by the German Government through the International Climate Initiative (IKI).

GNI^{plus} combines the strengths of three world-leading organisations – Climate Policy Initiative, AECOM, and Pollination. It provides governments with the best available policy, technical, financial, governance, and legal expertise to support the implementation of their NDCs. GNI^{plus} also supports governments as they work to mobilise private investment and create long-term, sustainable growth and development.

About AECOM

AECOM is the world's trusted infrastructure consulting firm, delivering professional services throughout the project lifecycle – from planning, design and engineering to program and construction management. On projects spanning transportation, buildings, water, new energy and the environment, our public- and private-sector clients trust us to solve their most complex challenges. Our teams are driven by a common purpose to deliver a better world through our unrivalled technical expertise and innovation, a culture of equity, diversity and inclusion, and a commitment to environmental, social and governance priorities. AECOM is a Fortune 500 firm and its Professional Services business had revenue of $13.2 billion in fiscal year 2020. See how we are delivering sustainable legacies for generations to come at aecom.com and @AECOM.

Funders

Supported by:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

based on a decision of the German Bundestag

Executive Summary

This report details the findings of the Mount Elgon Payment for Ecosystem Services (PES) Scoping Study. The aim of this project is to scope the potential for setting up a PES scheme on the Kenyan side of Mount Elgon. It is envisaged that the payments generated through the PES scheme could provide a sustainable source of finance for the conservation of the natural ecosystem and indigenous forests present in the Mount Elgon Water Tower. Water Towers are elevated geographical areas comprising mountains, hills, and plateaus where the topography, geology, soils and vegetation support the reception, retention, infiltration, and percolation of precipitation and storage as groundwater that is eventually released through springs, streams, rivers, swamps, lakes, and oceans to sustain connected biodiverse ecosystems and where it is harnessed for use (KWTA, 2018). In addition to supporting the indigenous forest ecosystems, a PES would have the co-benefit of supporting livelihoods for local communities and their cultural heritage and protecting and conserving the cave elephants and other wildlife in the area.

This work is intended to support the aims of the Mount Elgon Foundation (MEF), which was established to preserve the natural and cultural heritage of Mount Elgon on the Kenya-Uganda border. More specifically, MEF aims to find ways to mitigate human/elephant conflict and to seek inscription of the area into the UNESCO World Heritage list. MEF's lead activity is the Mount Elgon Elephant Project (MEEP). MEEP aims to protect the fragile population of the world famous 'cave elephants' on Mount Elgon in western Kenya, which have been observed going deep underground in the caves to mine salt. MEEP is being implemented as an East African Wild Life Society (EAWLS) project in collaboration with National Museums of Kenya (NMK), Kenya Wildlife Service (KWS), and Kenya Forest Service (KFS). It is supported by MEF in the UK, charitable funders, and over 70 private donors. The collaborating partners are also working on other initiatives in the area including a water project to support both a tree nursery promoting reforestation and irrigation for food security and poverty alleviation.

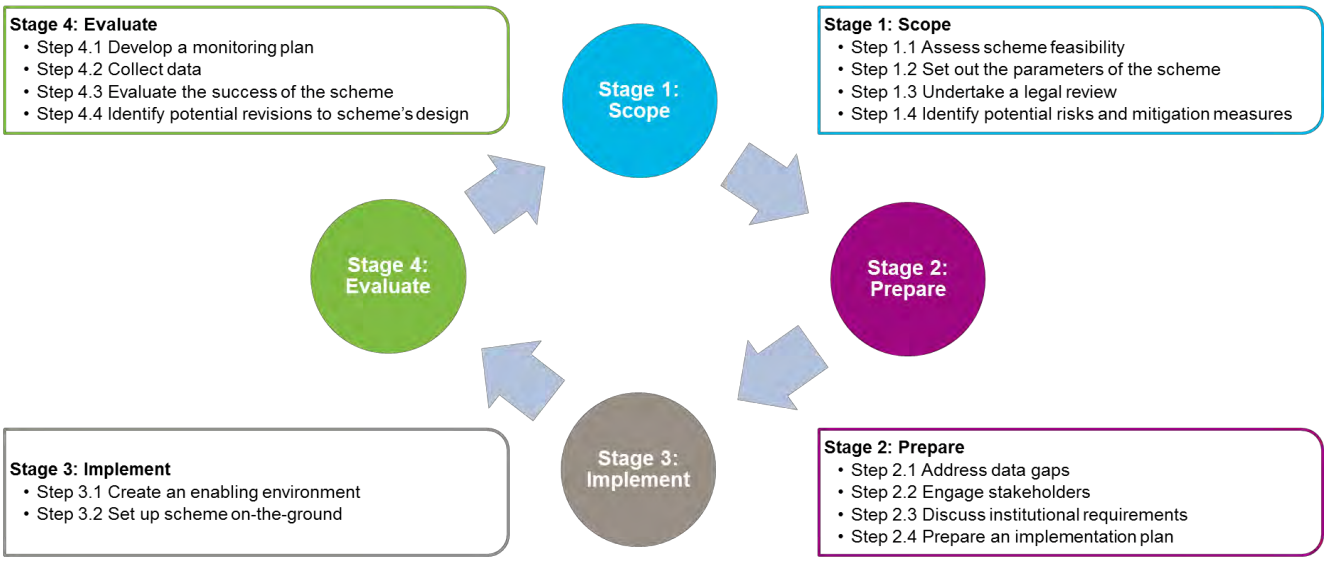
The scoping stage documented in this report is the first in a four-stage conceptual framework for designing and implementing PES scheme (Figure A1). The framework was developed by AECOM on the basis of a review of existing PES frameworks (Fripp, 2014; Martin-Ortega et al., 2013; Smith et al., 2013; Katoomba Group, 2008) and has previously been applied to conduct a similar study in Ethiopia and Chyulu Hills in Kenya.

The aim of the scoping stage is to provide an initial assessment of PES feasibility within the study area and set out the key parameters for how a prospective scheme could be implemented. Following completion of the scoping stage, the next stages would be to:

- Prepare a more detailed plan setting out how the scheme could be implemented on the ground;
- Set up and implement the scheme; and
- Evaluate the impacts of the scheme, using any lessons learned from the evaluation to revise the scope and parameters of the scheme in future years.

Together, the four stages are intended to be part of an ongoing, iterative process through which a PES scheme can be continually refined and improved.

Figure A1: Outline of the four stage PES framework



Source: White et al. (2016)

As the first step, a high-level assessment of the types of services provided by Mount Elgon's ecosystems was undertaken. A checklist of potential ecosystem services was developed, and each ecosystem service was assessed to identify the extent of provision by the Mount Elgon ecosystem, the people or groups who benefit from the service, and the likely demand or willingness/ability to pay for the service. This information was then used to identify which services are (i) currently being provided and of importance in the area and (ii) most likely to be suitable for inclusion in a Mount Elgon PES scheme.

Four ecosystem services were identified as having the highest potential for supporting a PES:

- Timber (sustainable provision of wood and non-wood forest products);
- Water quality regulation;
- Global climate regulation (carbon sequestration); and
- Wild species diversity (biodiversity).

A feasibility assessment was carried out to assess the potential costs and benefits of implementing a PES scheme around each of the prioritised ecosystem services.

The results of the feasibility assessment highlight the wider opportunities for bundling or linking forest carbon-based PES to conservation-based PES activities and the production of certified sustainable wood and non-wood forest products. Actions necessary to protect and restore biodiversity and their associated costs can overlap with those necessary to avoid or remove carbon emissions and sustainable forestry.

In particular, the feasibility assessment findings suggest there is potential for setting up a bundled PES focused on carbon sequestration and storage. The design of the scheme would be such that the interventions that are implemented to enhance carbon sequestration would also enhance the delivery of a wider range of ecosystem services, including biodiversity conservation, water quality regulation, pollination, and soil quality, while also improving livelihoods.

Because additional benefits would also be provided by the scheme, the carbon credits could be sold at a premium and the revenues used to support additional conservation and livelihood improvement activities. The interventions might include afforestation (through agroforestry), forest conservation (through reduced encroachment into forested areas) and more sustainable agricultural land

management practices. More detail on methods, assumptions and caveats regarding the feasibility assessment is provided within the main part of this report.

The feasibility assessment findings were used to identify key parameters for a potential bundled PES scheme and were presented at two workshops: the first in Nairobi on 7th December 2021 and the second in Kitale on 9th December 2021. Stakeholder viewpoints were used to:

- Further develop / refine key parameters identified and gauge interest and reaction to potential PES activities;
- Identify key risks and challenges associated with key parameters of a potential scheme; and
- Identify actions which are necessary to progress through Stage 2 of the PES framework.

An outline of the key parameters of a potential PES scheme on Mount Elgon is set out in Table A1. At this stage, these are indicative of the potential design of a prospective PES scheme and provide the starting point and focus for more detailed research in Stage 2 of the PES framework.

Table A1: Potential key parameters for a PES scheme on Mount Elgon

Item	Potential parameter
Objectives	Investigate the potential for setting up a bundled PES focused on carbon sequestration and storage. The design of the scheme would be such that the interventions that are implemented to enhance carbon sequestration would also enhance the delivery of a wider range of ecosystem services including biodiversity conservation, water quality regulation, pollination, and soil quality while also improving livelihoods. Because of the additional benefits provided, the carbon credits could be sold at a premium and the revenues used to support additional conservation and livelihood improvement activities. The interventions might include afforestation (through agroforestry), forest conservation (through reduced encroachment into forested areas) and more sustainable agricultural land management practices.
Ecosystem services	Primary service: Global climate regulation through the sequestration and storage of carbon by forests, trees and soils. Note that depending on the standard used to verify the project, there may be a need to monitor and verify (but not necessarily quantify) impacts on other ecosystem services including habitat for biodiversity.
Environmental co-benefits	Habitat for biodiversity, water quality regulation, improvements in soil quality, hazard (e.g., flooding and erosion) control, pollination, air quality, provision of more sustainable sources of wood, fuelwood, wild foods, and potentially higher crop yields, and opportunities for eco-tourism. The net impact of PES activities on water supply and food security should be closely monitored.
Social co-benefits	Potential social co-benefits include income generation/poverty alleviation by providing communities with employment and income-generating opportunities, as well as the associated benefits to health and wellbeing that higher and more sustainable household income affords. Habitat restoration, protection and enhancement activities could also provide benefits to cultural and spiritual practices and provide opportunities for scientific learning.

Item	Potential parameter
Potential buyers	Potential buyers could be international organisations (or individuals) looking to purchase premium offsets on the voluntary carbon markets, where the premium is linked to positive biodiversity and social impacts. There may also be interest from local business owners, particularly agri-business and large energy users who may be interested in offsetting their emissions by investing in a local carbon offset project. There may also be potential to layer on a visitor-giving element whereby visitors (e.g., to the National Park) make discretionary payments into a fund which is used specifically to finance activities targeted at biodiversity conservation.
Sellers	Sellers would include local communities, conservation groups, organisations with landownership in the area (e.g. a portion of payments could support KWS and KFS), small-scale farmers, and others who live and work on the land and who have rights to the ecosystem services to be sold. The potential involvement of existing community associations such as CFAs, WRUAs and CWAs in the project area should be clarified as should potential synergies and overlaps with existing initiatives such as the Kenya Carbon Project and FAO's Integrated Landscape Management project. Ideally, where these community entities exist in the PES scheme area, they would be involved in the proposed voluntary PES, as the entities may facilitate engagement and collaboration and could also potentially provide a mechanism for aggregating sellers (e.g., by acting as community representatives) thereby reducing the transaction costs associated with engaging separately with multiple individuals or groups.
Intermediaries	There are a large number of organisations and community members involved in the management, protection, and ownership of land on Mount Elgon. Consideration therefore needs to be given to whether one of these entities could act as a 'Project Office' in terms of coordinating project activities, acting as an 'honest broker' between buyers and sellers, and providing financial management and administrative support, or whether a new entity (e.g., a conservation trust) should be established to take on this role. The choice of an appropriate intermediary body should be confirmed in Stage 2.
Knowledge providers	Knowledge providers could include any organisation able to provide technical advice, data or other information essential to the development and implementation of the scheme. These could include resource management experts, valuation specialists, land use planners, county government, carbon offset project developers and business and legal advisors. Some of the organisations that could potentially be involved in the development of a carbon-based PES in Mount Elgon include KEFRI, NMK, KWS, KFS, KWTA, FAO, MEEP, universities and those involved in other PES and carbon offset projects in Kenya who may be able to share valuable lessons and guidance.
Geographical scale	The PES study area for Mount Elgon can readily align with the existing Mount Elgon Water Tower boundary. Further work is needed in Stage 2 to identify specific geographic areas for: i) forest protection, management and enhancement, ii) implementation of agroforestry and other sustainable agricultural land management practices (including afforestation), iii) sustainable extraction of forest resources including areas for local communities to access the forest for the purposes of harvesting wood products and iv) core biodiversity protection areas (which may align with forest carbon protection areas). These provisions would typically be included in an environmental management plan (required by most carbon standards) and monitored according to a monitoring plan. The geographical scale will also, at least in part, be driven by the location of communities who wish to be engaged in the scheme.
Interventions	The primary interventions funded through PES revenues are anticipated to include tree-planting (which may need to be supported by the establishment of new/or expanded seedling nurseries), the adoption of improved agricultural land management practices (e.g., residue management, cover cropping, integrated pest management, composting, etc.) as well as any necessary training activities, monitoring and enforcement services. These activities would need to be underpinned by comprehensive land management and monitoring plans which would need to be developed as part of the final project design and which would also be necessary to support validation of a carbon offset project against any of the relevant carbon

Item	Potential parameter
	standards (e.g., VCS or CDM)
Quantification of services	In the absence of detailed site-specific information, quantification of carbon sequestration in Stage 1 has been performed using the Tier 1 approach set out in the IPCC guidance which is broadly in line with an UNFCCC Approved Methodology for afforestation/reforestation on degraded lands. A more detailed assessment using project-level data and based on an approved methodology for either afforestation/reforestation or sustainable agricultural land management would be required if seeking validation of the scheme against a recognised standard. In order to generate premium credits, the carbon offset project could be validated to an enhanced standard by, for example, combining the VCS with Climate, Community and Biodiversity (CCB) Standards[1]. If pursuing CCB accreditation (for premium offsets), monitoring and verification of biodiversity and other environmental and social impacts would be required. Regular species surveys and monitoring could help with quantification of biodiversity impacts against a project baseline. Sustainable forestry activities could be volumes of wood and non-wood forest products harvested/produced in line with a Sustainable Forest Management Plan. Social co-benefits could be quantified through records of jobs, skills, income generation, and health and wellbeing of the local population, measured against an established baseline. The CCB Standards criteria ensure that projects: • Identify all stakeholders and ensure their full and effective participation; • Recognize and respect customary and statutory rights; • Obtain free, prior and informed consent; • Assess and monitor direct and indirect costs, benefits and risks; • Identify and maintain high conservation values; and • Demonstrate net positive climate, community and biodiversity benefits
Type of payment	Payment vehicle structure should be informed by law and preference of PES participants. For instance, some payees may not want payments to go directly to individuals, but rather to a third-party entity that can manage and distribute the funds. There should be emphasis on transparent and equitable benefit sharing (e.g., there could be a mechanism for PES scheme participants to vote on the allocation of funds or participants could submit 'proposals' to access funds for specific activities). In some instances, cash payments might be accompanied by in-kind payments such as the provision of capacity building, advice on best practice or help with accessing grants. It should also be noted that while PES is generally conceived of as a series of payments in exchange for the provision of ecosystem services, in practice PES schemes may also involve one-off payments, for example to cover the upfront costs of ecosystem restoration.

[1] https://www.climate-standards.org/ccb-standards/

Item	Potential parameter
Contractual format	The most appropriate form of contract will need to be identified in Stage 2 as this will be determined, in least in part, by the architecture of the PES scheme and, more specifically, the intermediary organisation that will be responsible for administering the scheme, the number of 'sellers' (i.e., those responsible for implementing the agreed interventions) and the nature of the buyer(s). Form and length of contract to be explored in consultation with ecosystem sellers and with potential buyers. Contracts with ecosystem service providers may need to be aligned with the carbon standard to which the carbon offset project is likely to be verified. Access rights for indigenous / local communities to access and harvest should be featured in the contract. In the case of a public forest, KFS involvement and consent will be necessary to be able to monetise potential PES activities (e.g., through a concession or joint management agreement). The PES scheme would need the approval and participation of KFS, KWS and County Government, where the national reserve is under the management of the County Government and not KFS. This is based on the oversight mandate bestowed on these entities with respect to public land. Further work should investigate the potential to integrate visitor giving with the carbon credit scheme (e.g., potentially through m-pesa/ PayPal / QR code payment).
Approach to monitoring	Monitoring of any carbon benefits will be determined by the carbon standard that is used to verify the carbon credits from the scheme. If opting for CCB certification, a means of monitoring non-carbon benefits will also be required. Local community and indigenous groups, other relevant groups (e.g. CFAs), and regional government officers could support monitoring activities but may require training to do so. All credits to be independently validated and verified to ensure that planned activities result in the impacts claimed over the duration of the project, providing assurance to all actors involved. The net impact of PES activities on food security and water resources should be carefully monitored. The net impact of PES activities on the following should also be closely monitored: ▪ Water supply (afforestation could have the potential to decrease surface water through evapotranspiration and/or increase groundwater through greater infiltration). ▪ Food security (as potential for cropland to be lost through agroforestry or afforestation).

A legal review was undertaken to explore the legal implications associated with a potential PES and highlight key recommendations and issues that would need to be resolved prior to implementing the scheme. The scope of the review included national and county policies that might impact PES, the legal and regulatory framework which would govern payments and potential implications for contracts, an overview of land ownership or tenure issues that need to be considered, and other key legal issues or risks.

Whereas the legal review found that Kenya does not have an overarching legal or regulatory framework setting out the modalities of how a PES project is to work, different sectoral laws provide an enabling environment for the implementation of voluntary PES schemes focused on different specific ecosystem services. It should be noted that this is an evolving area—the Government of Kenya has a national PES group that is providing recommendations on national level policy and is developing its approach on jurisdictional REDD+ that would affect REDD+ projects and the sale of carbon credits. Both of these activities may affect a voluntary PES scheme and should be closely monitored to evaluate the extent to which they may affect the analysis.

The legal analysis found that there are no impediments for the prospective PES scheme; however, the following points should be borne in mind:

- Given the contested land ownership, it is necessary to have clear determination of the exact PES scheme area, to determine whether the project falls inside or outside the gazetted forest

area and therefore to determine the rightful ecosystem service providers (sellers) of the PES scheme.

- Depending on the nature of the PES scheme, activities focused on and the exact scheme area, the informed consent of Kenya Forest Service (KFS), Kenya Wildlife Service (KWS) and the County Government will need to be sought as has been highlighted in this report.
- Kenya's legal framework envisions community participation in environmental management through diverse community entities such as Community Forest Associations (CFAs) and Water Resource Users Associations (WRUAs). It is not clear to what extent these groups are in existence in the proposed project area, and this will need to be clarified.
- For a PES on global climate regulation, it will need to be ascertained that there is no concurrent ongoing REDD+ project in the same area as the PES scheme, as the right to carbon from the same activities could not be also transferred to the PES buyers where the sellers have already transferred that right in the carbon credit under the REDD+ project.
- The ongoing moratorium on logging of timber from public and community forests will need to be closely monitored for clarity on which forests have harvesting allowed and on what terms.

The findings of the legal review and feedback from stakeholder workshops were used to develop an outline of the risks to a potential PES scheme and potential mitigation measures (which are presented in the report).

The final step of this PES scoping study was to develop a PES Action Plan for Mount Elgon. As shown in Figure A2, the PES Action Plan outlines key activities that could be undertaken by stakeholders in the short, medium, and long-term to move through Stage 2. It is the hope of the GNI[PLUS] partners and the study team that relevant organisations and/or groups within the Mount Elgon region agree a way to assign and adopt these actions to continue the work of developing a bundled PES scheme in the area.

Figure A2: PES Action Plan

Stage 2: Prepare

	SHORT-TERM (6 months – 1 year)	MEDIUM-TERM (1 – 3 years)	LONG-TERM (3 years + or throughout PES)
Address Data Gaps	Undertake a **land tenure assessment** and develop a **detailed plan to identify specific geographic areas** for: i) forest protection, management and enhancement (in terms of condition), ii) implementation of agroforestry and other sustainable agricultural land management practices (including afforestation), iii) sustainable extraction of forest resources including designated areas for local communities to access the forest for the purposes of harvesting wood products, and iv) core biodiversity protection areas (which may align with forest carbon protection areas).	Use the geographic areas identified to **refine key components** from the feasibility assessment to **re-assess the estimated costs and benefits** of developing and operating a carbon offset project within the defined geography using more detailed, site-specific information. Explore the **potential of elephant carbon mechanism** and whether / how this may support a potential scheme.	Identify **key stressors on the ecosystem**, both in general and specific (as far as possible), in order to address these stressors and **mitigate them** through the scheme.
Engage Stakeholders	**Undertake comprehensive stakeholder consultation** to identify the potential stakeholder groups (including Community Farming Associations (CFAs) and informal settlers) who may be interested in, or impacted by, the scheme and steps should be taken to agree their role(s) in the PES and address their concerns. **A clear plan for community sensitisation and conflict mitigation and management** should be developed, including the identification of who will lead on these initiatives, when and how. **Engage with government / stakeholders in Uganda** to make them aware of the intentions on the Kenyan side of Mount Elgon. Undertake **formal engagement with relevant national government institutions** to endorse and support the implementation of the PES scheme.	**Review of lessons learned from previous studies** to agree key parameters with stakeholders, including contractual formats and payments. Conduct **community sensitivity analysis** and undertake **conflict mitigation and management activities.** **On-going assessment and inclusion of wider communities** (i.e. outside the current proposed project area) to be included as stakeholders as the PES scheme develops.	Continue to undertake **conflict mitigation and management activities** throughout the PES scheme timeline. **Monitor legal land disputes and outcomes**, maintaining close contact with parties involved.
Map Institutional Requirements	Use the findings of Kenya Forest Research Institute (KEFRI) (Langat et al, in publication)[1] to identify the **technical / institutional capacity of key stakeholders and technical experts.** Identify ways to fill any **capacity / knowledge gaps** and develop a **capacity building plan** with relevant organisations and PES stakeholders.	**Implement the capacity building plan** with required activities for local communities / government / CFAs and other actors.	**Continue to identify and undertake capacity building activities** throughout the timeframe of the implementation and operation of the PES scheme.
Prepare Implementation Plan	Clearly define the **PES scheme area, activities** to be undertaken by different stakeholders, and determine the rightful **ecosystem service providers and beneficiaries**. There is need to determine permissions for local communities to use the forest, for example where ownership is vested in Kenya Forest Service (KFS). Develop **financial plan** to support the set up and implementation of the PES scheme, as well as identify and apply for funding through appropriate sources.	Produce a **detailed environmental management plan** (aligned with those required by most carbon standards) and monitor according to a monitoring plan. **Monitor the actions of the Kenyan Government national working group on PES** – established to set national-level PES policy. This group has not published any recommendations as yet, but its actions should be monitored to the extent it impacts a voluntary carbon PES scheme.	**Update the implementation plan regularly**, keeping it flexible and adaptable to conditions on the ground, monitoring how it's working etc. Ensure that the **monitoring tools / systems / technologies** needed are **fit for purpose** and **can be accessed** by all stakeholders.

[1] Langat D.K., Kisiwa A.K., Ojung'a S.O., Kiprop J.K., Leley N.C., Ongugo P.O., Chebotwo J.K., Kagombe J.K (In publication). Analysis of organizations capacity to undertake PES schemes: A case study of Cherangany and Mt. Elgon Forest ecosystems.

Note: In order for the action plan to be successfully implemented, key stakeholders need to be identified to deliver the actions outlined above.

Acronyms

A/R	Afforestation and Reforestation
AET	Actual Evapotranspiration
BioCF	World Bank's BioCarbon Fund
CBD	Convention on Biodiversity
CDM	Clean Development Mechanism
CERs	Certified Emissions Reductions
CFA	Community Forestry Associations
CICES	Common International Classification of Ecosystem Services
CIFOR	Center for International Forestry Research
COP	Conference of the Parties
EA	Iber Africa
EAWLS	East African Wild Life Society
ESCONET	Escarpment Environment Conservation Network
ESFM	Ecologically sustainable forest management
ESG	Environmental, Social, and Governance
FAO	Food and Agriculture Organization's
FCMA	Forest Conservation and Management Act
FSC	Forest Stewardship Council
GBM	Green Belt Movement
GHGs	Greenhouse gas emissions
HFWQ	The human footprint on water quality
HH	Households
ICRAF	World Agroforestry Centre
IFRI	International Forestry Resources and Institutions
IIED	International Institute for Environment and Development
IMF	International Monetary Fund
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
KEFRI	Kenya Forestry Research Institute
KFS	Kenya Forest Service
KWS	Kenya Wildlife Service
KWTA	Kenya Water Towers Agency
LULC	Land Use/Land Cover
LULUCF	Land-use, land-use change and forestry
MA	Millennium Ecosystem Assessment
MEEP	Mount Elgon Elephant Project
MEF	Mount Elgon Foundation
NCS	Natural climate solutions
NEMA	National Environmental Management Authority
NGO	Non-governmental organization
NMK	National Museums of Kenya
OECD	Organisation for Economic Co-operation and Development
PEFC	Programme for the Endorsement of Forest Certification
PELIS	Plantation Establishment and Livelihood Improvement Schemes
PES	Payment for Ecosystem Services
PFM	Participatory forest management
PRESA	Pro-poor Rewards for Environmental Services in Africa
REDD+	Efforts reducing emissions from deforestation and forest degradation, conservation of existing forest carbon stocks, sustainable forest management and enhancement of forest carbon stocks
tCERs	Temporary carbon credits
TIST	The International Small Group and Tree Planting Program
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard
WCMA	Wildlife Conservation and Management Act, 2013
WTP	Willingness to pay

Table of Contents

List of Figures

List of Tables

List of Boxes

1. Introduction

Mount Elgon is an extinct shield volcano located on the border of eastern Uganda and western Kenya. In Kenya, the Mount Elgon ecosystem is gazetted as a montane forest reserve (73,705 hectares), a national park (16,916 ha), and a nature reserve (17,200 ha). The ecosystem is a critically important natural capital asset providing a range of valuable services and benefits that make a significant contribution to the well-being of people living within the region.

The ecosystem contains habitats which support unique and diverse fauna and flora of global importance, historical resources and heritage assets, and attractions such as the Kitum caves, where elephants 'mine' the rock for its salt. The area was designated as a Biosphere Reserve by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2003.

Mount Elgon is one of the five main 'Water Towers' (see Box 1) of Kenya. It is the head catchment area for two major rivers: the Nzoia and the Turkwel. The Nzoia River is a critical water source for Western Province where it provides most of the water for highly populated areas before flowing into Lake Victoria. The Turkwel River is one of three major rivers that feed Lake Turkana; it provides water to the Turkwel Gorge dam and its hydropower plant and is the main river that crosses the semi-arid and arid areas of the region to the south west of Lake Turkana (Langat et al., 2019; KWTA, 2018).

Box 1: Water Towers

Water Towers are elevated geographical areas comprising mountains, hills, and plateaus where the topography, geology, soils and vegetation support the reception, retention, infiltration, and percolation of precipitation and storage as groundwater that is eventually released through springs, streams, rivers, swamps, lakes, and oceans to sustain connected biodiverse ecosystems and where it is harnessed for use (KWTA, 2018).

These Water Towers provide critical ecosystem services to the country, supporting economic sectors including energy, tourism, agriculture, and fisheries, among others. Kenya's Water Tower ecosystems supply water to several urban centres and support the livelihoods of millions of people living within and beyond their boundaries. Combined, they provide an estimated 75 percent of the country's water resources (UNEP, 2012).

The forest cover on Mount Elgon plays an important role in the prevention of landslides and downstream flooding and in the conservation of soil and water resources. Furthermore, Mount Elgon's vegetation and soils store and sequester substantial volumes of carbon, thereby contributing to global climate change mitigation.

Despite the critical role that the Water Tower plays in sustaining a healthy population and supporting the country's key economic sectors, including agriculture, tourism and energy, it faces serious threats. The degradation of Water Towers in Kenya has been linked to a wide range of issues including:

- siltation of dams
- deterioration of water quality
- the drying up of rivers and increased fluctuation of water levels in lakes
- declines in agricultural productivity due to irregular rainfall and lack of water for irrigation
- increased water use conflicts due to competition between users
- intermittent shortages of electricity, and
- wider environmental degradation.

Some of the most significant pressures on the Mount Elgon ecosystem include agricultural encroachment, charcoal burning, illegal extraction of forest products, and expansion of settlements, all of which may be linked to a growing population. There are conflicts over land tenure, and forested land is at risk of being de-gazetted for settlement, primarily as part of efforts to resolve historical land injustices, reduce conflicts and spur local development (CIFOR, undated). Furthermore, climate change is likely to exert further pressures on the forest resource as a result of prolonged droughts, increased risk of wildfire and changes in the distribution and composition of montane vegetation (Olage et al., 2015).

Alongside these, inadequate public financing for the protection of watershed services provided by Water Towers more generally across Kenya has impeded efforts to halt or reverse their degradation (USAID, 2020). This has been compounded by a lack of awareness among landowners of the wider impacts of their land management decisions and the potential income they could derive from the provision of watershed services that are vital to communities and businesses elsewhere.

In recent years there have been significant advances in our understanding of the science of ecosystem services and in our ability to establish the benefits that people derive from these services and the values they place upon them. This in turn has supported more widespread emergence of market-based and other innovative financial mechanisms that enable these values to be reflected in decision-making through incentives and price signals. Payments for Ecosystem Services (PES) are an example of such a mechanism and a focus of this report.

1.1 Payments for Ecosystem Services

PES offer an innovative means of generating funds to incentivise efforts to protect and restore the natural environment. PES is a term used to describe arrangements through which payments are made by the beneficiaries, or users, of ecosystem services to landowners or land managers in return for a guaranteed flow of ecosystem services (or, more commonly, for management actions that enhance their provision) over-and-above what would otherwise be provided in the absence of payment (Smith et al., 2013).

For example, farmers might receive payments from downstream water consumers or hydropower operators for adopting practices that can be linked to improvements in water flows downstream which would not otherwise have been be provided without payment (Smith et al., 2013).

Wunder (2005) identified five PES principles which are used to define PES schemes:

- A voluntary transaction where
- A well-defined ecosystem service (or a land-use likely to secure that service)
- Is being 'bought' by a (minimum one) ecosystem service buyer
- From a (minimum one) 'ecosystem service provider'[2]

[2] It should be noted that 'ecosystem service provider' is the term used to refer to those who own or manage land and other natural resources in such a way as to protect, maintain or restore the provision of a defined service or suite of services that are provided by ecosystems. Although reference to land managers or owners as 'ecosystem service providers' is commonplace in PES literature, it is nevertheless important to distinguish between the ecosystems which give rise to the services, and land managers or stewards whose decisions can affect the ongoing provision of those services.

- If and only if the 'ecosystem service provider' secures ecosystem service provision (conditionality).

It is, however, widely recognised that very few, if any, PES initiatives meet all these principles simultaneously. More typical arrangements meet the following criteria (IIED, 2008):

1. There is a provider or seller of ecosystem services responding to the offer of a payment, whether from a private entity, NGO, local or central government agency, in order to address an environmental externality; and/or there is a user of ecosystem services, who is distinguishable from the seller and is not a central government agency, making payments so that ecosystem services can be enhanced or protected through land management.

2. The provider of ecosystem services enters voluntarily into the transaction; and

3. The payment is conditional on previously agreed land use that is expected to provide the ecosystem service(s).

With an effective PES mechanism in place, those responsible for managing natural assets have the necessary financial incentive to protect the flow of these services despite the costs involved in maintaining them. An illustration of the PES concept is shown in

Figure 1 which depicts one of the most common types of PES scheme.

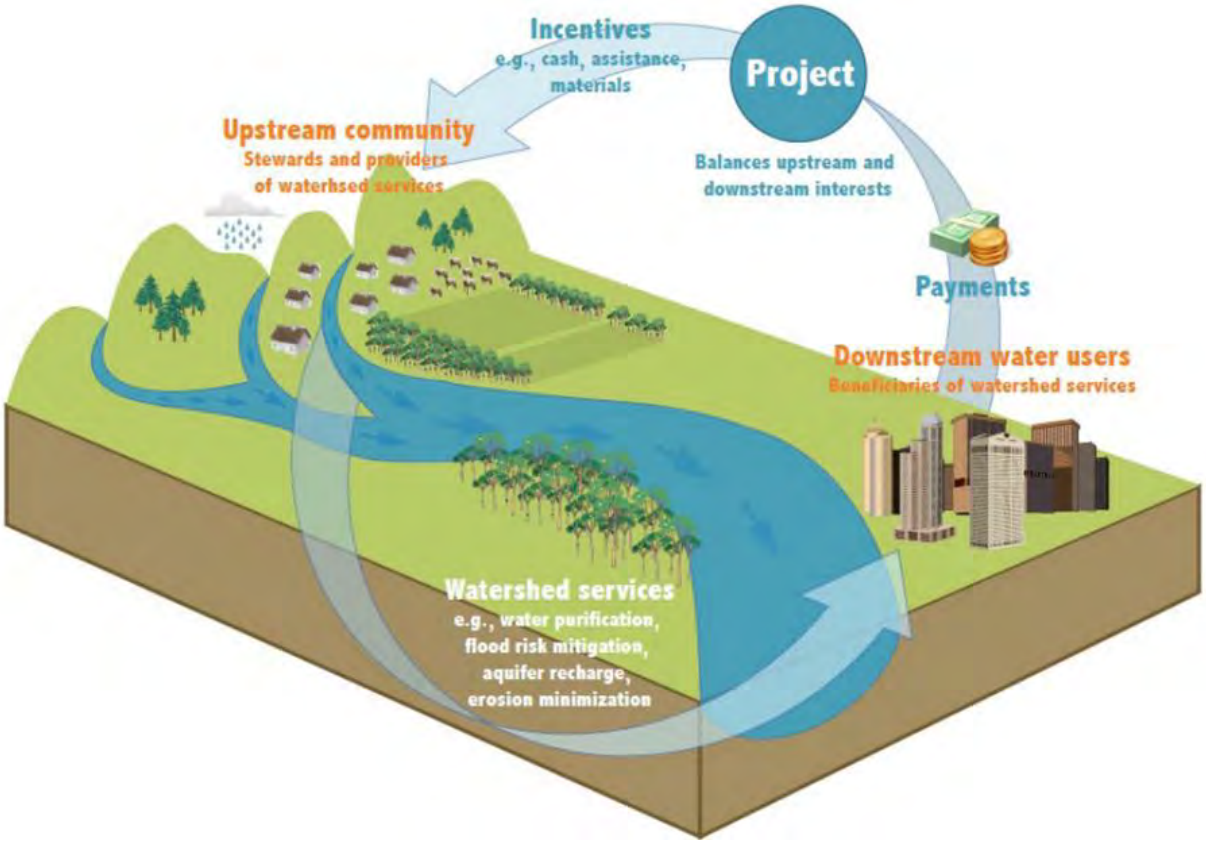


Figure 1: The PES concept

Source: Bennett et al., 2013

The payments are intended to provide incentives to landowners and managers to engage in activities such as afforestation, reforestation or changes in agricultural practices that restore, protect or enhance stocks of natural capital (such as forests or waterbodies) over which they have management control, and the associated ecosystem services and benefits that this natural capital provides. This approach recognises the important role that the environment plays in contributing to our wellbeing and economic prosperity, and the potential of market-based approaches to promote conservation

and address environment-related market failures.

In some cases, payments are made directly by the beneficiaries of ecosystem services, such as, for example, a local hydropower company paying landholders in an upper watershed for maintenance of forest cover for the benefits of erosion control which prolongs the life of the dam and/or reduces the need for and costs of dredging. In other cases, national or local governments may pay on behalf of their citizens. According to recent research, the role of the private sector is also growing among PES schemes at both international and local levels (OECD, 2020; Salzman et al., 2018).

Broadly, PES schemes can be divided into two categories:

- Public payment schemes for private landowners to maintain or enhance ecosystem services through direct grants, without competitive elements (i.e. government-financed PES).[3]
- Market schemes in which individual beneficiaries or consumers of ecosystem services contract directly with land stewards (i.e. user-financed PES).

PES schemes are an increasingly popular conservation and resource management tool, particularly in developing countries, and have become a significant policy instrument in the last 15 years. Many schemes have emerged around the world. There are currently more than 550 documented PES schemes in place at national, regional and local levels with the volume of transactions estimated to be between US$ 36-42 billion in 2018 (Salzman et al., 2018).

One particular advantage of PES schemes is that they can attract participation on the part of the private sector. Private sector participation lessens the financial burden on government, and the private sector can potentially offer efficient and innovative mechanisms to manage risk thereby reducing transaction costs. Further, where public capital is scarce, attracting private finance can provide a sustainable source of funding that makes it more likely that PES can become a viable model that is replicable in other geographies and sectors.

The services that are most often secured through PES schemes include (IIED, 2008; Wunder, 2005):

1. Carbon storage and sequestration: this includes land use practices that conserve or increase carbon stocks such as those supported through REDD+ schemes (i.e. Reducing Emissions from Deforestation and forest Degradation, plus the sustainable management of forests, and the conservation and enhancement of forest carbon stocks).[4]

2. Biodiversity: this includes land use practices that promote the conservation of biological diversity and ecotourism opportunities that promote wildlife conservation.

3. Water resources management: this includes land use practices that promote the conservation of watershed functions, particularly in terms of water quality and water supply.

4. Scenic beauty: this includes 'conservation fees' paid by tourists to community-based and other tourism organisations in support of efforts to promote and sustain nature-based tourism.

[3] Bennett, G., Nathaniel, C., and Hamilton, K. (2013). Charting New Waters: State of Watershed Payments 2012. Washington, DC: Forest Trends [online] available at www.ecosystemmarketplace.com/reports/sowp2012

[4] For further information see: http://www.fao.org/redd/en/

PES in Kenya

A cross-sector study led by the Kenya Forestry Research Institute (KEFRI) (Kagombe et al., 2018) identified 15 PES projects that have been implemented in Kenya. The services these cover, either individually or in combination include carbon sequestration, biodiversity conservation, and watershed protection. A summary of selected PES schemes in Kenya is provided in Table 1.

There is evidence (Kagombe et al., 2018) to suggest that PES schemes in Kenya have promoted conservation efforts using a wide range of incentives that are stipulated in negotiated agreements with communities and individuals to promote stewardship of natural resources. Furthermore, this research found that PES schemes in many cases have provided benefits and income opportunities to local communities including increased agricultural incomes, social assets (e.g. educational facilities, healthcare access), and employment as well as biodiversity conservation. The study concluded that agencies with an interest in forestry and other environment services should continue to pursue the path of PES mechanisms to address environmental degradation and diminishing environmental resources (Kagombe et al., 2018).

Table 1: Summary of selected PES schemes in Kenya

Name of scheme	Location	Ecosystem services provided	Buyers	Sellers	Intermediaries
Water supply / water quality					
Upper Tana Nairobi Water Fund	Upper Tana-Nairobi basin	Water quality Water supply	The fund aims to attract finance from private water consumers (e.g. Coca-Cola, Nairobi Sewage, breweries)	Farmers and landholders	TNC, International Centre for Tropical Agriculture (CIAT), Global Environment Facility (GEF), Government of Kenya
Naivasha Basin PES Scheme (or Incentives for Ecosystem Services)	Naivasha Basin	Water quality Improved soil nutrient cycling	Lake Naivasha Growers Group and local hotels	Local farmers	WWF, CARE, International Aid agencies, Water Resource Users Associations
Sasumua Pro-poor Rewards for Environmental Services in Africa (PRESA)	Sasumua Catchment area	Water quality Water supply	Kenya Agricultural Productivity and Sustainable Land Management Project (KAPSLM) is currently acting as a "dummy" buyer until private funding is secured	Smallholder farmers	Water Resource Users Associations, World Agroforestry Centre (ICRAF), KAPSLM
Western Kenya Integrated Ecosystem Project	Nyando and Yala river basins	Soil quality Water quality	World Bank	Smallholder farmers	The Kenya Agricultural Research Organisation (KALRO)
Carbon					
The Tree Fund	Various locations in Kenya	Carbon storage Biomass production	TNC is seeking investors to capitalise the fund	Smallholder farmers	The Nature Conservancy (TNC)
Chyulu Hills REDD+	Chyulu Hills	Carbon storage	International carbon credit buyers	Local community	Chyulu Hills Conservation Trust (CHCT), many local NGOs, Conservation International, Wildlife Works

Name of scheme	Location	Ecosystem services provided	Buyers	Sellers	Intermediaries
Kasigau Corridor REDD+	Between the Tsavo East and Tsavo West National Parks	Carbon storage	International carbon credit buyers	Local community	Wildlife Works
Mikoko Pamoja Mangrove Conservation and Restoration Project	Gazi Bay	Carbon storage	International carbon credit buyers	Local community	Plan Vivo, Bangor, Edinburgh Napier, and Edinburgh Universities
Escarpment Environment Conservation Network (ESCONET)	Great Rift Valley	Carbon storage	International carbon credit buyers	Farmers and landholders	Red Cross
Bio Carbon Project	Mt. Kenya and Aberdare	Carbon storage	World Bank	Farmers and landholders	Kenya Forest Service, Green Belt Movement
The International Small Group and Tree Planting Program (TIST)	Various locations around Mount Kenya	Carbon storage	International carbon credit buyers	Local farmers	TIST and Clean Air Action Corporation (CAAC)
Naivasha Afforestation Fund	Naivasha basin	Carbon storage	International carbon credit buyers	Local farmers	WWF
Biodiversity					
Predator Compensation Fund	Mbirikani Group Ranch	Biodiversity	Tourists, Ol Donyo Wuas lodge, Big Life Foundation	Local community	The Maasai Land Preservation Trust Kenya
Wildlife Conservation Lease Program	Kitengela, adjacent to Nairobi National Park	Biodiversity	Local organisations (Friends of Nairobi National Park) and international donors	Local landholders	Kenya Wildlife Service, Friends of Nairobi National Park, The Wildlife

Source: AECOM (2020)

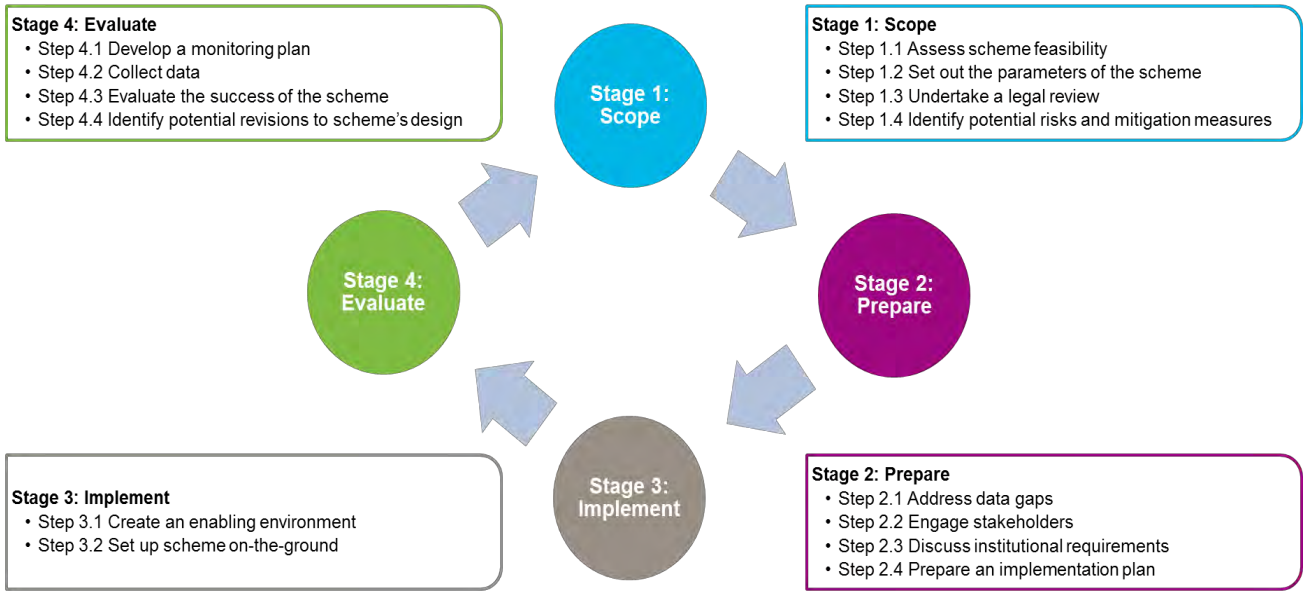
1.2 Project aims and objectives

This report has been delivered under the Global NDC Implementation Partners (GNIplus) project being implemented in Kenya. It is a three-year project funded by the German Government through the International Climate Initiative (IKI). As part of GNIplus, this project aimed to scope the potential for setting up a PES scheme on the Kenyan side of Mount Elgon. It is envisaged that the payments generated through the PES scheme could provide a sustainable source of finance for the conservation of the natural ecosystem and indigenous forests present in the Water Tower. This would have the co-benefit of supporting livelihoods for local communities and their cultural heritage and protecting and conserving the cave elephants and other wildlife in the area.

This work is intended to support the aims of the Mount Elgon Foundation (MEF) which was established to preserve the natural and cultural heritage of Mount Elgon on the Kenya-Uganda border. More specifically, MEF aims to find ways to mitigate human/elephant conflict and to seek inscription of the area into the UNESCO World Heritage list. MEF's lead activity is the Mount Elgon Elephant Project (MEEP). MEEP aims to protect the fragile population of the world famous 'cave elephants' on Mount Elgon in western Kenya which have been observed going deep underground in the caves to mine salt. MEEP is being implemented as an East African Wild Life Society (EAWLS) project in collaboration with National Museums of Kenya (NMK), Kenya Wildlife Service (KWS), and Kenya Forest Service (KFS). It is supported by MEF in the UK, charitable funders, and over 40 private donors. The collaborating partners are also working on other initiatives in the area including a water project to support both a tree nursery promoting reforestation and irrigation for food security and poverty alleviation.

The scoping stage documented in this report is the first in a four-stage conceptual framework for designing and implementing PES scheme (see Figure 2 below). The framework was developed by AECOM on the basis of a review of existing PES frameworks (Fripp, 2014; Smith et al., 2013; Katoomba Group, 2008; Martin-Ortega et al., 2013) and has previously been applied to conduct a similar study in Ethiopia and Chyulu Hills in Kenya.

Figure 2: Outline of the four stage PES framework



Source: White et al. (2016)

The aim of the scoping stage is to provide an initial assessment of PES feasibility within the study area and set out the key parameters for how a prospective scheme could be implemented. Following completion of the scoping stage, the next stages would then be to:

- Prepare a more detailed plan setting out how the scheme could be implemented on the ground;
- Set up and implement the scheme; and
- Evaluate the impacts of the scheme, using any lessons learned from the evaluation to revise the scope and parameters of the scheme in future years.

Together, the four stages are intended to be part of an ongoing, iterative process through which a PES scheme can be continually refined and improved.

1.3 Aim and structure of this report

This report presents the findings of the Mount Elgon PES Scoping Study. Following a description of the study area in Section 2, the remainder of the report is structured around the objectives of Stage 1, as follows:

- Assess scheme feasibility (Section 3);
- Set out scheme parameters (Section 4);
- Undertake a legal review (Section 5);
- Identify potential risks and mitigation measures (Section 6); and
- Next steps (Section 7).

It is important to note that the assessment undertaken at this stage is high level. It identifies the most likely candidate ecosystem services for inclusion in a PES scheme based on a review of secondary information and preliminary stakeholder engagement. As such, this does not necessarily mean that other types of PES schemes are not viable in the study area, but rather that the services identified are priorities for further investigation in subsequent stages as they would appear at this stage to have the highest likelihood of supporting successful PES. While it is expected that primary research, including consultation with relevant PES actors (buyers, sellers and intermediaries), will narrow the range of services to be included in a Mount Elgon PES scheme, it is conceivable that some of the services scoped out in this stage, could be reconsidered.

2. The study area

The aim of this chapter is to define the spatial extent of the study area (i.e. the area over which the potential for PES has been investigated) and to provide a brief overview of the key characteristics of the area in terms of climate, population, broad habitats, land uses and threats and pressures.

2.1 The PES study area

2.1.1. LOCATION

The Mount Elgon Water Tower is located on the border of eastern Uganda and western Kenya. The Kenyan side of the Water Tower falls within Bungoma and Trans Nzoia counties. The Water Tower covers around 107,821 ha which is divided between Mount Elgon National Park (16,916 ha), Chepkitale National Reserve (17,200 ha), Mount Elgon Forest Reserve (73,705 ha) and a 5 km buffer zone of 68,080 ha (outside of the Water Tower boundary).

For the purposes of this project, the study area is defined by the gazetted forest boundary (which includes the Water Tower boundary) which is shown by the red line boundary in Figure 3.

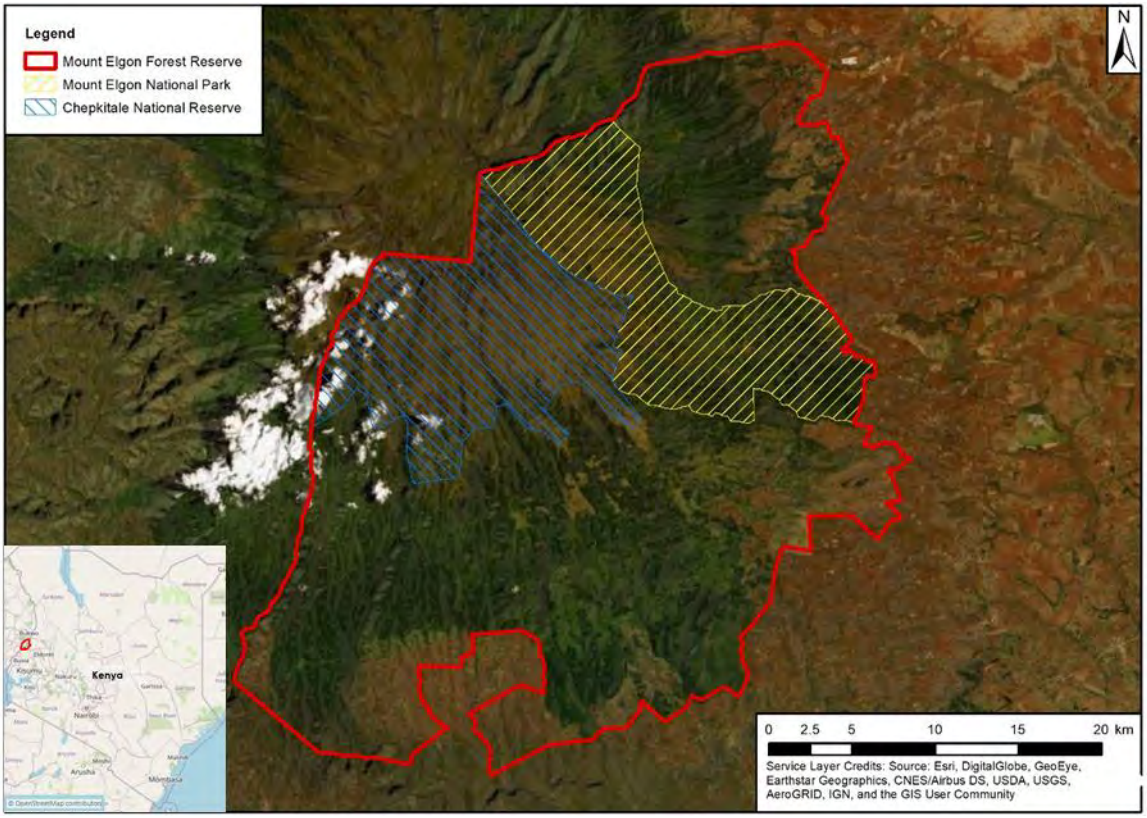


Figure 3: Location of Mount Elgon study area

Source: AECOM

2.1.2. ENVIRONMENTAL CONTEXT

Land cover and land use

The MEEP team provided data from previous Land Use/Land Cover (LULC) studies in the region. This included data from Kenya's Regional Centre for Mapping of Resources for Development (RCMRD) from 2014, as presented in Error! Reference source not found.. Note that this dataset excludes both the M ount Elgon National Park and Chepkitale National Reserve, outlined in yellow and blue respectively. The RCMRD dataset distinguishes between the following habitat types:

- Dense forest
- Moderate forest
- Open forest
- Wooded grassland
- Open grassland
- Perennial cropland
- Annual cropland
- Vegetated wetland
- Open water
- Otherland

There are also areas with 'no data', likely a result of cloud cover. Note that these classifications may vary across data sources and may be further refined over time as a result of technological advances which support higher resolution mapping and more accurate classification of habitat types.

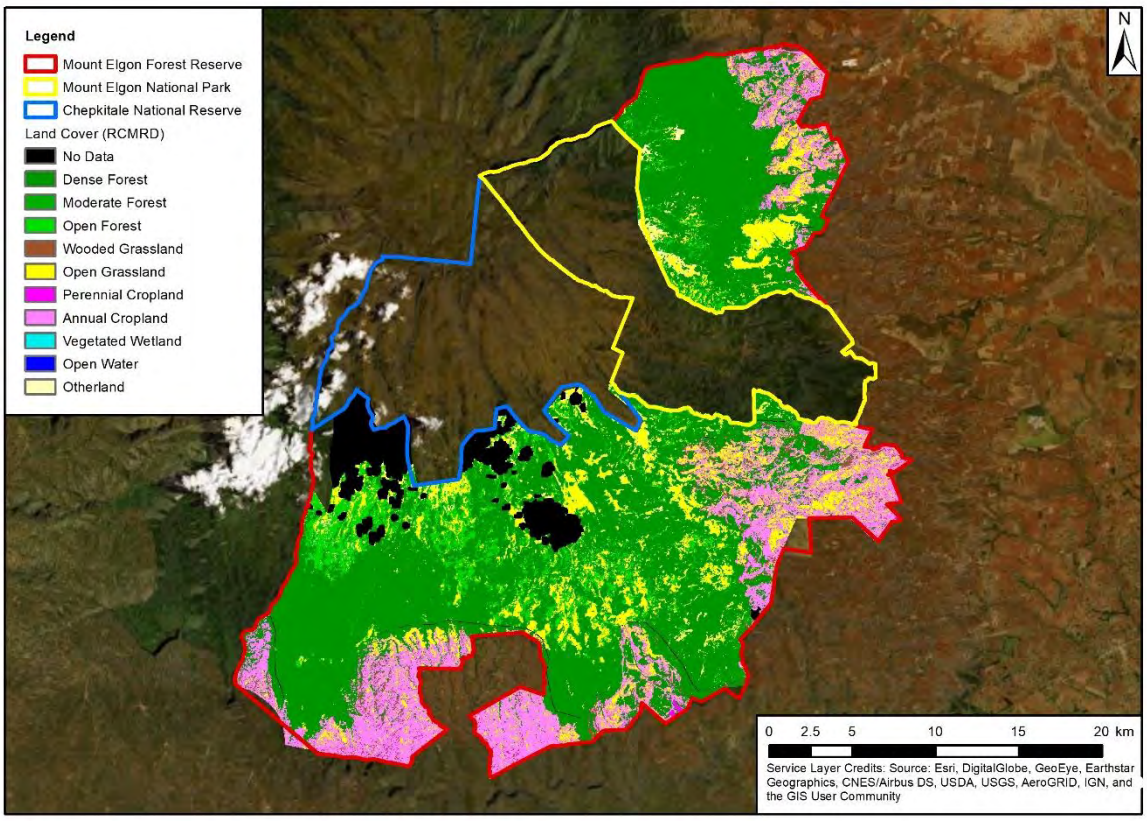


Figure 4: Landcover 2014

Source: AECOM, developed from RCMRD data

The situation in 2018 is shown in Figure 5 using LULC data which also includes partial coverage of the Chepkitale National Reserve area and Mount Elgon National Park. It is estimated that coverage is missing for around 3,900 hectares of land within the study area.

As different methods have been used for the different classifications, direct comparisons should not be made, but general trends such as increased crops lands from 2014 and 2018 can be seen.

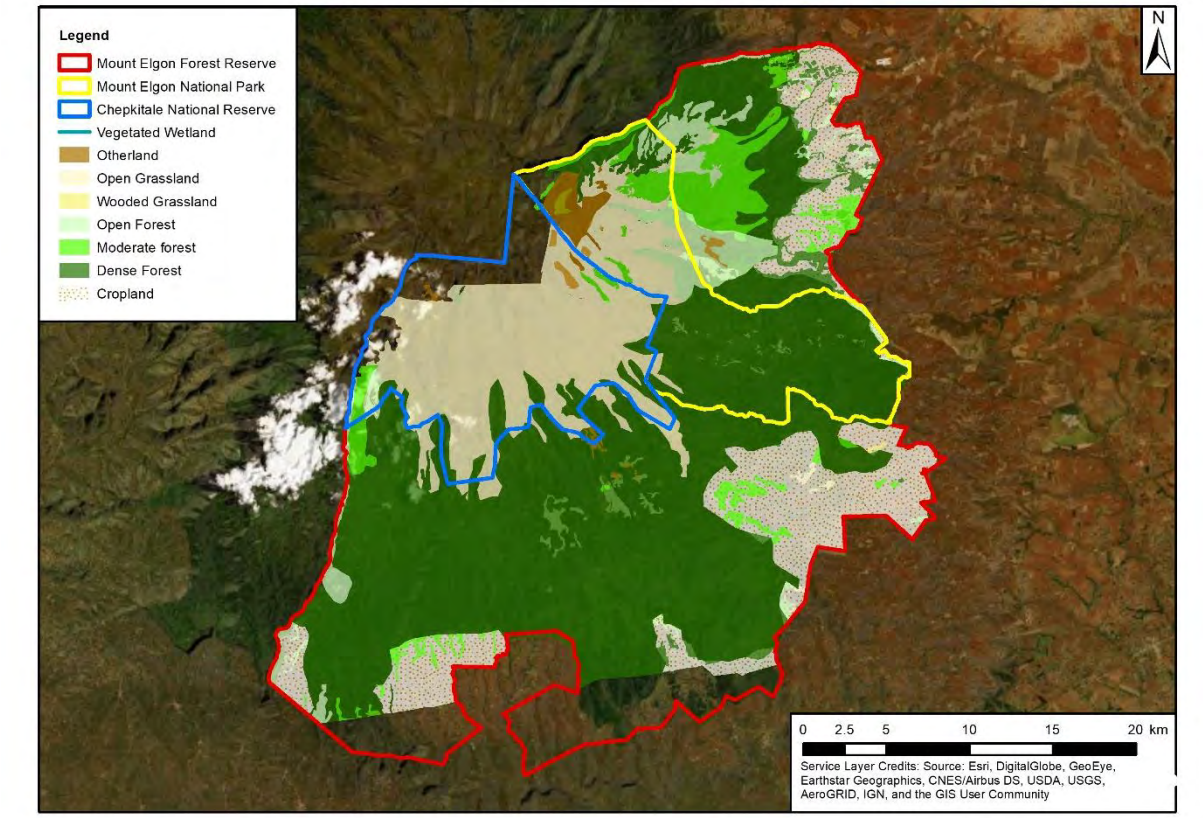


Figure 5: Landcover 2018

Source: AECOM, developed from LULC from Copernicus Sentinel-2 data

Copernicus Sentinel-2[5] remote sensing data was acquired for March 2021. Habitat classification was carried out using supervised classification methods in ArcPro. This produced full coverage LULC mapping for the Mount Elgon study area, as shown in Figure 6.

[5] For more detail see: Coperniucus Open Access Hub.

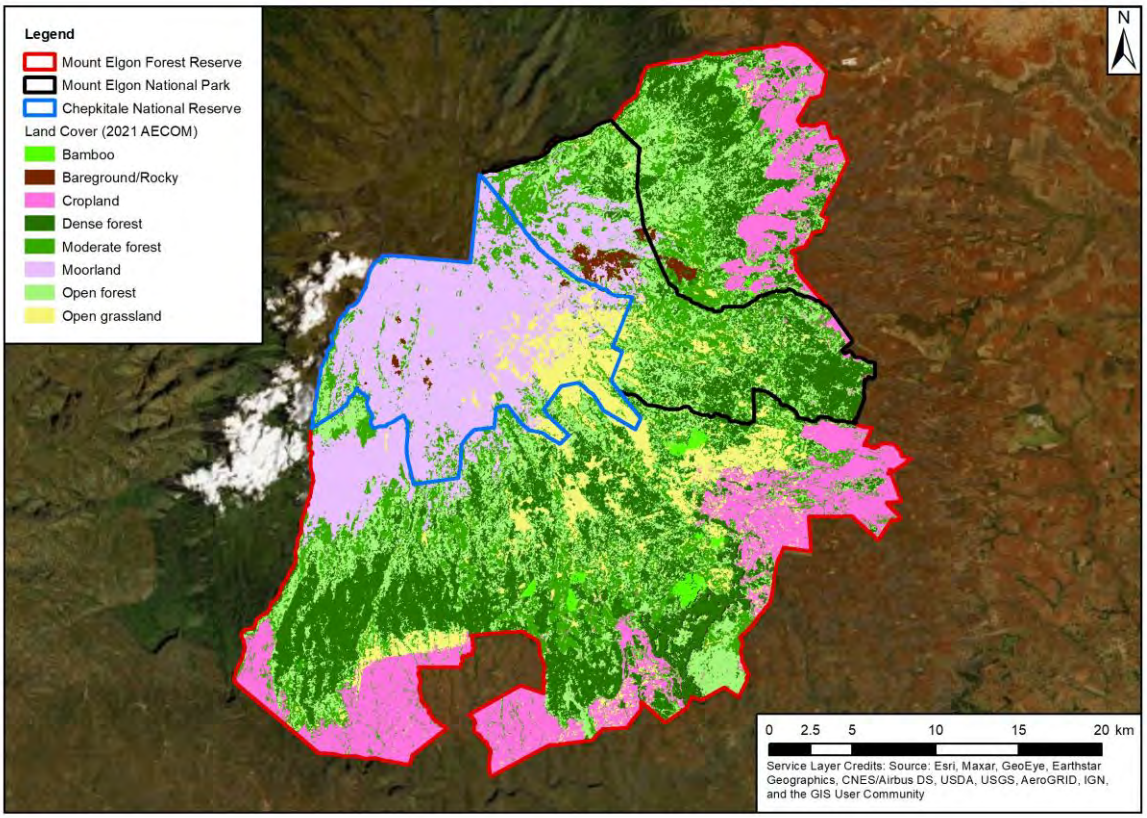


Figure 6: Landcover 2021

Source: AECOM

Table 2 provides a further breakdown of the estimated area of habitats at Mount Elgon in March 2021.

Table 2: Breakdown of Mount Elgon habitat areas

Habitat	Area (ha)
Cropland	27,920
Dense Forest	25,239
Open Forest	20,549
Moorland	18,569
Moderate Forest	17,652
Open Grassland	9,463
Bare ground / Rocky	715
Bamboo	634

Source: AECOM

Additional work has been undertaken by AECOM to develop a time-series of habitat maps for Mount Elgon (at staged intervals to be decided). This exercise benefited from MEEP's local knowledge to provide a high-level 'ground-truthing' of results. This will provide a more detailed knowledge base for assessing habitat changes in the area over time.

Hydrology

The Mount Elgon ecosystem serves as a headwater for the drainage system of three lakes: Lake Victoria and Lake Turkana in Kenya and Lake Kyoga in Uganda. The key rivers include the Turkwel River which drains into Lake Turkana and provides water to the Turkwel Gorge dam and its hydropower plant, Nzoia which drains into Lake Victoria, and Malakisi that drains to Lake Kyoga. The Nzoia River is a critical water source for Western Province where it provides most of the water for highly populated areas before flowing into Lake Victoria.

Frequent landslides and floods initiated by high rainfall and land degradation in the area have claimed lives and destroyed property in the recent past (KNA, 2020; Claessens et al., 2007). Furthermore, climate change is likely to affect hydrological processes, with some recent studies (e.g., Musau et al., 2015) projecting high increases in stream flows between August and November which will exacerbate existing flooding and landslide risks.

Flora and fauna

The flora of the Mount Elgon ecosystem can be divided into distinct belts, which reflect altitude and climatic zones. The major altitudinal vegetation belts from the base to top of the mountain are montane rainforest (moist lower montane rainforest) (1500-2450 m and dry lower montane rainforest 2000-3050 m), bamboo forest (2450-3050 m), upper montane forest (3050-3300 m), Ericaceaous belt (also called moorland, 3300-3550 m) and the Afroalpine zone (above 3550 m) (Ballatore and Olaka, 2015). These habitats can be more generally described in terms of five broad plant communities: grassland, bushland, forest, forest edge, and cultivated fields (Langat et al., 2019).

Distinctively, this area is home to Mount Elgon's famous 'cave elephants' which travel deep underground in caves, some over 150 m deep, to forage for the minerals contained in the volcanic deposits, so called "Salt Mining". Existing studies indicate Mount Elgon is also home to 37 globally threatened species (22 mammals, 2 insects and 13 bird species) and 9 endemic species, making the area a priority for species conservation (Langat et al., 2019; KWTA, 2018). The alpine chat, long-crested eagle, Cape robin-chat, and yellow-whiskered greenbul are among the 240 documented bird species. The region is also classified as an Important Bird Area (IBA) according to the International Wildlife Classification System (KWTA, 2018). A total of 67 reptiles and amphibians and 179 species of butterflies have also been documented in the Mount Elgon region (Makenzie, 2016; Davenport, 1996; Larsen, 1991).

Climate

Mount Elgon's climate varies from moist to moderately dry and receives average annual rainfall of 1,270 mm (KWTA, 2018). The region's climate is heavily influenced by the altitudes of the mountain and its proximity to Lake Victoria which creates atmospheric moisture, and its elevation (Ballatore and Olaka, 2015). Figure 7 below presents the average monthly rainfall, temperature and wind speed for Mount Elgon. As shown, the Water Tower receives higher rainfall from April to October and lower rainfall on average from December to February. Precipitation varies with altitude; the upper slope receives higher rainfall as compared to the low-lying areas. Similarly, the temperature changes with altitude, cooler in higher altitudes and warmer in lower altitudes (Meteoblue, 2020; KWTA, 2018; Ballatore and Olaka, 2015).

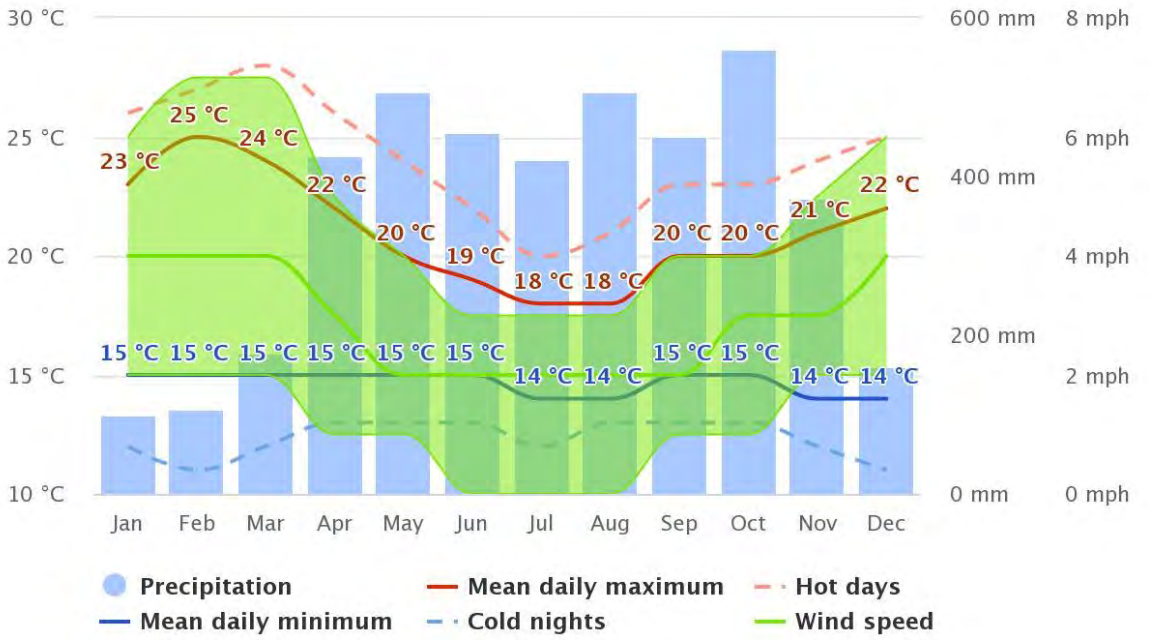


Figure 7: Mount Elgon average monthly climate conditions[6]

Source: Meteoblue (2020)

The forest zone of Mount Elgon receives the most rainfall with areas to the north, and northwest, which include the districts of Nakapiripirit and Amudat in Uganda and Kacheliba and Kapenguria in Kenya, receiving much less, in some cases reaching semi-arid conditions (Ballatore and Olaka, 2015). Anecdotal evidence gathered by Ballatore and Olaka (2015) suggests that the pattern of rainfall has become less predictable and severe events more common. Wind speeds for the region are greatest on average from December to April.

The climate of Mount Elgon is changing due to global warming. In a research project conducted by Olago et al. (2015), resident communities reported higher temperatures and more erratic, variable and intense rainfall accompanied by changes in the onset and cessation of rainy seasons and the distribution of rains within the season. The effects of these changes included reduced streamflow and groundwater recharge, increased soil erosion and landslides and changes to montane ecosystems. However, more work and better monitoring systems are required to generate more scientific data to enable quantification of these observed changes.

2.1.3. SOCIO-ECONOMIC CONTEXT

Population and livelihood activities

The population in the Mount Elgon region (spread over Kenya and Uganda) is ethnically and linguistically diverse and growing (Ballatore and Olaka, 2015). According to the 2009 Housing and Population Census, the Water Tower had a population of 420,798 persons with Kibingei, Saboi and Machewa locations having the highest number of persons while Elgon and Namorio locations the lowest. For population density, Namwela, Cheptais, Chesikaki and Kapsokwony locations had the highest population densities while the forest and Chephoina locations recorded the lowest (KWTA, 2018).

The livelihoods of the local communities are largely dependent upon subsistence agriculture. Nearly

[6] Based on 30 years of climate data.

80% of residents in the region are directly dependent on land through low-input subsistence agriculture or direct extraction of natural resources (KWTA, 2018). Crops include bananas, maize, tea, potatoes, tomatoes, onions, coffee, vegetables, millet, sweet potatoes, sorghum and sugarcane. Livestock reared include cattle, sheep, goats, poultry, and donkeys (for transportation). Household farm sizes are on average around one hectare with most households having owned the land for more than 10 years (KWTA, 2018).

The area is also characterised by high levels of forest dependence, a history of communal forestry and degradation of forest resources due to high levels of human activity (Yego et al., 2021). The main products extracted from forests are firewood, wild fruits and vegetables, and honey (Yego et al., 2021). There are also reports of poaching for bush meat and ivory (Mangat, 2021).

2.1.4. POLITICAL ECONOMY CONTEXT

Governance and institutions

In Kenya, the Mount Elgon ecosystem is gazetted as a montane forest reserve (73,705 hectares) managed by the Kenya Forest Service (KFS), Mount Elgon National Park (16,916 ha) managed by the Kenya Wildlife Service (KWS), and a nature reserve (17,200 ha) managed by Bungoma County Government. The KFS areas are currently administered by eight gazetted forest stations namely Saboti, Mount Elgon (Kip-togot), Sosio, Suam, Kimothon in Trans-Nzoia County, and Cheptais, Kaberua and Kaboiywa forest stations in Bungoma County (KWTA, 2018; Ballatore and Olaka, 2015) and are co-managed jointly with forest-adjacent communities via Community Forest Associations (CFAs) (see Box 2). Areas managed by the Bungoma County Government are communal while KWS is solely responsible for managing the National Park.

Box 2: Community Forestry Associations

Community Forestry Associations (CFAs) are registered community organisations made up of people residing adjacent to a forest (Mogoi *et al*., 2012; Republic of Kenya, 2016; Republic of Kenya, 2005). Under the Forest Acts of 2005 and 2016, CFAs acquire access and user rights and responsibility for co-managing state-owned forests with the Kenya Forest Service (KFS), the agency in charge of protected forests (Kairu et al., 2018; Chomba et al., 2015).

In order to acquire participatory forest management (PFM) rights and responsibilities, CFAs have to first develop a management plan which must be approved by KFS with whom they also sign a management agreement (Thygesen *et al*., 2016; Chomba *et al*., 2015). The management plan outlines the forest activities that the community will undertake, while the agreement confers management rights and responsibilities to the CFAs. The user rights may include the collection of non-timber forest products (e.g. harvesting of honey, poles, grass, grazing and collection of medicinal herbs) and cultivation or growing of crops on degraded forest land. These rights are accompanied with responsibilities including developing management plans, establishing plantations, undertaking forest patrols, attending CFA meetings and paying forest user charges (Okumu and Muchapondwa, 2020). However, while the PFM governance framework, at least on paper, gives CFAs the right to co-manage and benefit from forests, recent research (Mbeche *et al*., 2021) suggests that household participation varies according to access to markets, household expenditure and expected forest benefits, off-farm income, distance to the forest and access to extension services.

There are also a number of tea zones at the boundary of the forest. These are owned by the Nyayo Tea Development Corporation and were established by the Government of Kenya in 1986 with the aim of promoting forest conservation by providing buffer zones of tea and other assorted tree species to prevent encroachment into the forested area.

The management of forest resources in Kenya is guided by the National Forest Policy (2014) supported by the Forest Conservation and Management Act (2016). The Directorate of Forestry Conservation within the Ministry of Environment and Forestry is mandated to formulate, interpret, monitor and coordinate forestry conservation strategic policies; develop, review and monitor the implementation of the national forestry conservation and management strategy; ensure sustainable exploitation, utilization, management and conservation of forestry resources; and ensure equitable sharing of the accruing benefits. KFS is a corporate body established under the Forest Conservation and Management Act with a mandate "*to provide for the development and sustainable management, including conservation and rational utilization of all forest resources for the socioeconomic development of the country and for connected purposes.*" It is responsible for the conservation, protection and management of all public forests in accordance with the provisions of the Act, including the preparation and implementation of management plans for these forests, as well as community and private forests where requested.

KWS was created as a parastatal in 1990 with the mandate to conserve and manage wildlife in Kenya, and to enforce related laws and regulations. It undertakes conservation and management of wildlife resources across all protected areas systems in collaboration with stakeholders. The community wildlife program of KWS in collaboration with others encourages biodiversity conservation by communities living on land essential to wildlife, such as wildlife corridors and dispersal lands outside parks and reserves. The organization also aims to use the wildlife resources of Kenya sustainably for the economic development of the nation and for the benefit of the people living in wildlife areas. KWS operates as a commercial entity and tourism provides a major source of revenue. A part of the KWS strategy is to share proceeds from tourism with the local communities inconvenienced by the presence of the wild animals or creation of the parks (in 2017 this amounted to around KES 228 million or ~ $USD 2 million (KWS (2017)).

Kenya Water Towers Agency (KWTA) is a State Corporation under the Ministry of Environment and Forestry established in 2012 through Kenya Gazette Supplement No. 27, Legal Notice No. 27 of 20th April 2012. The Agency is mandated to coordinate and oversee the protection, rehabilitation, conservation and sustainable management of all the critical water towers in Kenya.

Policy and regulation

There are several policies and regulations[7] in Kenya that are pertinent to the development of a PES scheme in Mount Elgon. A focused legal analysis was conducted to identify any key recommendations and legal issues that would need to be resolved prior to implementing a scheme. The scope of the review covered national and county policies that might impact PES; the legal and regulatory framework which would govern payments and any potential implications for contracts; an overview of any land ownership or tenure issues that need to be considered; and any other key legal issues or risks. These are discussed in more detail in Section 5 Legal analysis.

Other related projects and initiatives

There are a range of other actors in the area involved in activities supporting local communities and the management and conservation of the Mount Elgon ecosystem. The KWTA, KEFRI, and other research institutions have undertaken multiple projects in the area covering issues such as forest

[7] For example, a detailed assessment of the development and introduction of policies, regulation, legislation and other initiatives that influence Kenya's forestry sector can be found here: AECOM (2021). Climate Action in the Forestry Sector in Kenya: Status Review.

management and water quality of Mount Elgon river catchments and have made recommendations for interventions (Nadir et al., 2019). Other organisations operating in the area include the Center for International Forestry Research (CIFOR), the International Forestry Resources and Institutions (IFRI), the UN's Food and Agricultural Organization, grassroot NGOs and community organisations, and more.

Delivery of a successful PES scheme in Mount Elgon will require cooperative effort across many (if not all) of these actors to different degrees. This project sought to engage with as many stakeholders as possible during Stage 1. Our engagement activities included one virtual (online) workshop in September 2021 and two in-person workshops in December 2021, as well as several additional meetings with specific stakeholder organisations between January 2021 and January 2022. The feedback from these workshops has informed the development of key parameters (see Section 4) and a PES Action Plan for Mount Elgon – aiming to outline necessary activities to move to the next stages of PES design and implementation (see Section 7). More targeted engagement is needed in future stages as the scope of a prospective PES project becomes clearer and moves towards more detailed design. A non-exhaustive summary of some relevant recent and ongoing stakeholder projects, initiatives and activities is provided in Table 3.

Table 3: Relevant recent and ongoing project and programme activities in the Mount Elgon region

Project / initiative	Lead organisation(s)	Dates	Objectives and main activities
Plantation Establishment and Livelihood Improvement Schemes (PELIS)	KFS (on behalf of the Ministry of Finance)	2007 - ongoing	A forestry PELIS program has been operating since 2007 in Mount Elgon. All households living within a 5km radius of the forest reserve are eligible to join the PELIS programme but only 50% are currently participating (Waruingi, Mbeche and Ateka, 2021). The main objectives of the PELIS scheme are to enhance community participation in the restoration of forest ecosystems while simultaneously improving livelihoods. This is done through granting forest-adjacent communities the right to cultivate crops during the early stages of plantation establishment (typically the first 3-4 years).
Integrated Landscape Management for Conservation and Restoration of the Mount Elgon Ecosystem in Western Kenya	Food and Agricultural Organization of the United Nations (FAO)	2021 - ongoing	The aim of this project is to promote sustainable, integrated management of the Mount Elgon landscape through the development of inclusive coffee value chain and sustainable staple food production systems. The project comprises four components: • Development of integrated landscape management systems that support enhanced agricultural productivity and enhanced delivery of ecosystem services • Promotion of sustainable food production practices and responsible value chains, particularly for coffee and maize production systems • Conservation and restoration of natural habitats • Project co-ordination, collaboration, communication and monitoring & evaluation Ultimately the project seeks to restore 10,000 ha of natural habitats, improve land management practices over 50,000 ha, mitigate five million tonnes of carbon emissions and improve the livelihoods of around 60,000 people.
Enhancing Forest Landscape Restoration in Mount Elgon	Center for International Forestry Research (CIFOR)	2019	This study formed part of the Program on Policies Institutions and Markets (PIM), led by the International Food Policy Research Institute (IFPRI); and the CGIAR Research Program on Forest, Trees and Agroforestry (FTA), led by CIFOR. Making use of Participatory Prospective Analysis (PPA), the aim of the project was to bring various stakeholders together to discuss forest landscape restoration in the Mount Elgon Ecosystem and to create an action plan for the next 10 years. This included activities such as policy harmonisation, tenure clarification, finance-raising, mapping and improving forest products and services, and scaling up community engagement in Forest Landscape Restoration (CIFOR, undated).

Project / initiative	Lead organisation(s)	Dates	Objectives and main activities
The Economics of Natural Capital in East Africa Program	USAID	2021	USAID commissioned a study to describe and value the wildlife and habitats of four selected transboundary landscapes in East Africa, including the Northern Savvanas of South Sudan, Uganda and Kenya and adjacent Mount Elgon. The study findings are intended to improve the conservation and management of iconic and important transboundary East African wildlife landscapes by providing policymakers and advocates with information on their economic value.
Kenya Agricultural Carbon Project and the Livelihoods Mount Elgon Project	Vi Agroforestry (funded through World Bank BioCarbon Fund)	2009-2030 (carbon project) 2016 – ongoing (livelihoods project)	The Kenya Agricultural Carbon Project (KACP) promotes and implements a package of Sustainable Agricultural Land Management (SALM) practices within smallholder farming systems on approximately 45,000 ha in Nyanza and Western Provinces and generates greenhouse gas (GHG) removals through soil and tree carbon sequestration. The project intends to: • facilitate the adoption of SALM practices on 25,000 ha for soil and water resources conservation • improve the quality and increase the capacity of average milk production from 5,000 litres / day to 135,000 litres / day within 5 years and increase yields (by at least 30%) through SALM for increased soil and crop productivity • generate income through the sale of carbon credits in international voluntary carbon markets. The project has also been validated under Verra's Voluntary Carbon Standard (VCS)[8] • improve the knowledge, skills and income of 30,000 participating farmers to improve quality of life; increase their family health and nutritional status, facilitate establishment of strong farmer organizations for business and social empowerment, and increase participation of women in farmer organizations. The project involves around 30,000 farmers of which 15,000 will be specialized in dairy supply. Project activities are also financed through an impact investment fund created by private companies (the Livelihoods Fund), which supports the training and extension services provided to over 30,000 family farms. Brookside Dairy (one of Kenya's largest dairy producers) co-invests in the project and pays farmers for the milk they produce.

[8] For more information see: https://verra.org/project/vcs-program/

2.1.5. THREATS AND PRESSURES

Increasing human pressures due to growing populations, settlements, demand for arable and grazing land, and demand for timber resources is degrading the montane environment of Mount Elgon. Habitat degradation is leading to increased risks of hazards such as landslides, water shortages, water pollution, and biodiversity loss. These pressures are likely to be further exacerbated by the effects of a changing climate (Ballatore and Olaka, 2015), highlighting the need for adaptation and mitigation actions in order to build the resilience of both the natural and human communities and their associated natural and socio-economic systems.

A recent study by KEFRI (Langat et al., 2019) examined the most significant threats to Mount Elgon's forests as identified and ranked by local communities. The study findings are presented in Table 4. As shown, deforestation and overdependence on forest resources, and demand for wood products were jointly ranked the highest perceived threat to forest ecosystems. Invasive species and overstocking/grazing of livestock were jointly ranked the second-highest threat, followed by fire and encroachment. The remaining perceived threats to forest ecosystems included illegal harvesting/poaching and finally, with the lowest-relative rank, pollution. Results with no relative ranking were not perceived as threats by the local communities. Although not ranked, the study cited poverty and lack of alternative livelihoods as the underlying cause, in many cases, of overdependence on forest resources.

This information is useful when considering the scope of a prospective PES scheme, both in terms of understanding the particular drivers of deforestation and forest degradation that a PES scheme might address, as well as in the types of activities and support that may be necessary to alleviate the particular concerns and pressures felt by local communities. For example, based on this research it may be inferred that PES schemes focused on mitigation of deforestation fuelled by demand/dependence on wood and forest products and overstocking livestock would be more suitable than those aimed at or centred around decreasing pollution. It should be noted that the threats outlined above are interrelated; activities aimed at mitigating one perceived threat are likely to deliver co-benefits which may also mitigate others. This interrelationship, and the generation of co-benefits, will need to be considered in the design of any potential PES scheme.

Table 4: Local community ranking of threats to Mount Elgon forests

Threats	Relative ranking
Deforestation/overdependence	0.30
Demand for wood products	0.30
Grazing/overstocking	0.20
Invasive species	0.20
Fire	0.15
Encroachment	0.15
Illegal harvesting/poaching	0.05
Pollution	0.05
Poverty	-
Pests and disease	-
Charcoal burning	-
Low staffing	-
Government corruption	-

Threats	Relative ranking
Perception of low value	-
Climate change	-
Population growth/settlements	-
Technology (power saws)	-

Source: Langat et al. (2019).

Note: Relative rankings represent perceived threats; highest values represent those perceived as higher threats, and lower values represent those perceived as lower threats. Results with no relative ranking were not perceived as threats by the local communities.

3. Ecosystem services assessment

This section investigates which of the ecosystem services that are presently, or could potentially be, generated by the Mount Elgon ecosystem may be suitable for inclusion in a PES scheme. The assessment is conducted in two parts. The first part is a high-level assessment of the ecosystem services that are the most likely candidates for inclusion in a PES scheme and which are therefore the priority for more detailed investigation. The second part is a more detailed assessment that seeks to quantify and value levels of supply and demand and thereby to establish the financial viability of developing a market around each of the prioritised services.

3.1 Assessing the potential for PES

The opportunities for PES are most likely to arise in situations where the following three conditions can be met:

1. Specific land or resource management actions have the potential to increase the supply of a particular service (or services);

2. There is a clear demand for the service(s) in question, and its provision is financially valuable to one or more potential buyers; and

3. It is clear whose actions have the capacity to increase supply (for example, certain land or resource managers may be in a position to enhance supply).

There are also different ways in which ecosystem services may be incorporated into PES schemes (Smith et al., 2013):

- Bundling – where a single buyer, or consortium of buyers, pays for a suite of ecosystem services that arise from the same area of land or body of water.
- Layering – where multiple buyers pay separately for the ecosystem services that arise from the same parcel of land or body of water; layering is also sometimes referred to as 'stacking'. For example, an area of forest that is restored may yield a range of saleable ecosystem services benefits. The carbon sequestration benefits may be purchased by international businesses seeking to offset their carbon emissions, the water quality benefits may be purchased by municipal water authorities or hydropower operators who save on the costs of treatment or dredging, and the biodiversity benefits may be purchased by a wildlife charity on behalf of its membership or by tourists who wish to contribute to the conservation of wildlife and habitats.
- Piggy backing – where one service is sold as an umbrella service, whilst the benefits provided by other services accrue to users free of charge (i.e. the beneficiaries 'free ride'). Alternatively, there may be a hybrid whereby the PES scheme may be anchored around a single service (e.g. carbon sequestration) but may attract a price premium for the delivery of that service in recognition of the additional localised benefits such as improved soil and water quality, reduced flood risk and conservation of biodiversity. These services and benefits are not necessarily explicitly recognised or quantified within the package of services being sold but nevertheless clearly present as co-benefit but their ongoing provision could be monitored as part of regular project verification cycles.

These different packaging approaches are illustrated in Figure 8.

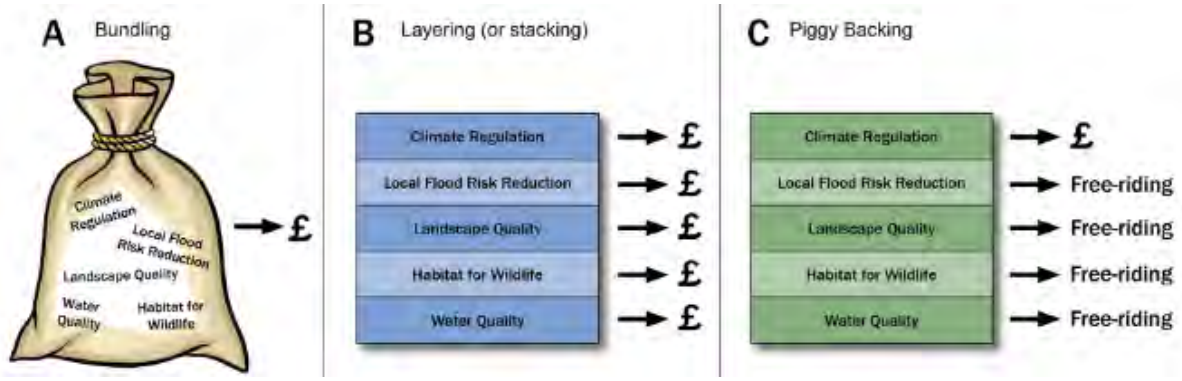


Figure 8: **Different approaches to 'packaging' ecosystem services in a PES scheme**

Source: Smith et al., 2013

In the initial stage of setting up a PES scheme, bundling or piggy backing is more typical due to the greater complexity of setting up a layered scheme.

For the purposes of this scoping study, the potential of each ecosystem service to act as an 'anchor' service is examined in turn. Where the service is judged unlikely to sustain a PES scheme on its own (i.e. where the demand and hence level of payments received for that service are unlikely to cover the costs of conservation), then the potential to combine two or more services into a broader package is also considered.

3.2 Prioritisation

A high-level assessment of the types of ecosystem services provided by Mount Elgon's ecosystems was undertaken. A checklist of potential services that could be provided by Mount Elgon's ecosystems was developed using the Common International Classification of Ecosystem Services (CICES)[9] as a starting point. CICES is based on a review of international ecosystem service classifications and can be directly linked to the Millennium Ecosystem Assessment (MA) ecosystem service categories (MA, 2005). Ecosystem services are typically organised into four broad groups:

- Provisioning services i.e. the products harvested from ecosystems such as crops, wild foods, and water.
- Regulating services i.e. the benefits arising from the regulation of natural processes such as carbon sequestration, hazard regulation and water quality regulation.
- Cultural services i.e. the social, spiritual, or aesthetic benefits that are provided by ecosystems.
- Supporting services[10] i.e. those that are necessary for the production of all other ecosystem services. These may include soil formation and nutrient cycling.

Each of the ecosystem services set out in Table 5 was assessed to identify the extent of provision by the Mount Elgon ecosystem, the people or groups who benefit from the service, and the likely demand or willingness/ability to pay for the service. It is important to note that different habitats within the ecosystem provide different types of services, for instance, plantation forests are typically less biodiverse than natural forests, while cloud forests play a greater role in regulating water supply than

[9] Haines-Young, R. and M.B. Potschin (2018):Common International Classification of Ecosystem Services (CICES) V5.1and Guidance on the Application of the Revised Structure.

[10] As supporting services are inherent for all ecosystem service provision, they have not been assessed separately to avoid potential double-counting of provision and/or benefits.

lowland forests. The assessment therefore identified the habitat or land cover types (see Section 2.2.2) which are relevant to the provision of particular services where appropriate.

This approach links habitats or land cover types (otherwise referred to as 'natural capital assets') to the ecosystem services they provide, and the value of the benefits provided, as shown in Figure 9.

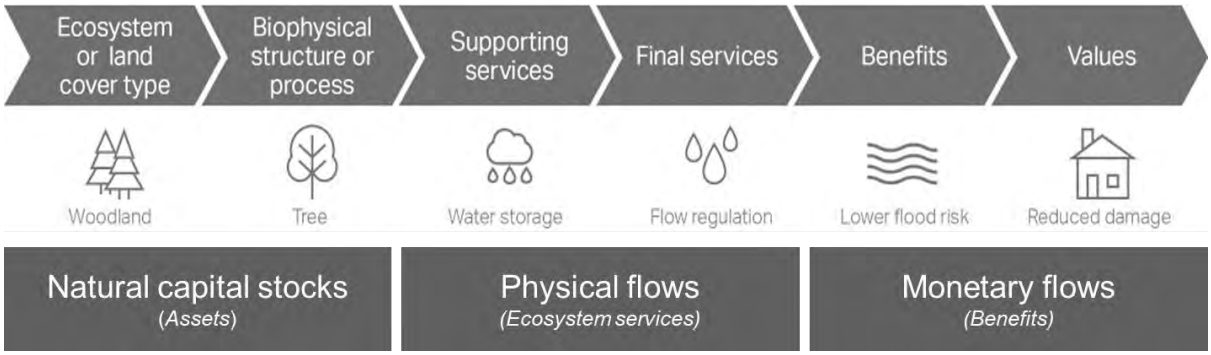


Figure 9: Overview of the link between natural capital assets, ecosystem service flows, and values generated, using woodlands as an illustrative example

Source: Adapted from Potschin and Haines-Young (2011)

This information was then used to identify which services are (i) currently being provided and of importance in the area and (ii) most likely to be suitable for inclusion in a Mount Elgon PES scheme. Services were classified using a simple system:

- LOW = unlikely to be able to incorporate the service into a PES scheme at this stage due to limited provision of the service, or limited understanding of its provision (e.g. in terms of an established cause-effect relationship and what could be done in terms of land management to increase its provision).
- MODERATE = service unlikely to facilitate a PES scheme on its own due to lack of a quantifiable evidence base, limited numbers of buyers, limited income or access to finance of potential buyers, or difficulties quantifying benefits as tradable commodities; however, service may be generated as a co-benefit by PES schemes targeting other services.
- HIGH = good potential for quantifying and trading the service in a PES scheme.

This assessment was supported by existing studies which prioritise and/or explore ecosystem services within the Mount Elgon region, including (among others):

- Langat et al. (2019). Economic Value of the Mau Forest Complex, Cherangany Hills and Mt. Elgon Water Towers in Kenya.
- USAID (2021, forthcoming). Protecting East Africa's Natural Capital, the cost of inaction. A preliminary synthesis of the economics of natural capital in East Africa.
- Kagombe, J.K., Cheboiwo, J.K., Gichu, A., Handa, C., Wamboi, J. (2018). Payments for environmental services: status and opportunities in Kenya.
- Kenya Water Towers Agency (KWTA) (2018). Kenya Water Towers Status Report for Mt. Elgon.
- Sumukwo et al. (2011). Financing provisions of Environmental Services in Mount Elgon Region for the protection of watersheds.

Table 5: Ecosystem service prioritisation results

Type	Ecosystem service	Priority based on provision & potential for inclusion in PES	Explanation
Provisioning	Crops (food)	Low	Smallholder and larger commercial farmers are present in the area, producing a range of crops including maize, beans, coffee, flowers, fruit and vegetables. Crops are produced primarily for subsistence use although surplus produce is sold locally to supplement household income as access to markets is limited. Forest ecosystems provide benefits to crop production through regulation of water supplies, water quality, and soil quality. However, a growing population is increasing the demand for land resulting in the encroachment of cultivated areas into forested and marginal lands. Given that crops are generally grown for subsistence use and that the promotion of crop production could contribute to deforestation and forest degradation, the potential for their inclusion in a PES scheme is considered to be low. Consideration has also been given to whether or not there may be opportunities to use PES to promote more sustainable land management practices, including tree planting on crop land and agroforestry which combines forestry with crop production. Research by Engel and Muller (2016) suggests that PES is a promising mechanism for promoting agroforestry and other 'climate smart' agricultural practices in small-scale farming contexts with low incomes. In addition to helping increase the soil carbon pool, agroforestry supports a range of other tree-related ecosystem services, such as regulation of water and sediment flows, nutrient cycling in soils and the provision of habitat for biodiversity. This leads to increased soil fertility, reduced soil erosion and flood and pest control. Benefits of agroforestry to smallholder farmers include increased farm productivity and reduction of external inputs such as conventional fertilizers and chemicals for pest management, leading to increased income. However, despite the potential of such practices, there is evidence to suggest that the results of their implementation can sometimes be mixed. For example, KFS has already introduced plantation establishment, the so-called Plantation Establishment Livelihood Improvement Scheme (PELIS) whereby forest-adjacent communities are granted rights to cultivate agricultural crops during the early stages of forest plantation establishment. While the scheme has resulted in the establishment of some forest plantations, a Government taskforce to inquire into forest resources management and logging activities in Kenya found these are often of low standard, comprised predominantly of non-indigenous species and have led to encroachment into indigenous forests (Ministry of Environment and Forestry, 2018). The Taskforce subsequently recommended that the PELIS should be progressively phased out over a four-year period. It is not clear to what extent this recommendation is being enacted but any potential PES scheme to promote agroforestry would need to complement PELIS or its successor.
	Livestock	Low	Most households in the region practice some form of livestock rearing. Livestock reared include cattle, sheep, goats and poultry which are all for household consumption, as well as donkeys for transportation. There are also a number of industrial dairy enterprises. Local farmers therefore depend on Mount Elgon's habitats for grazing. Given the limited landholdings of most farmers

Type	Ecosystem service	Priority based on provision & potential for inclusion in PES	Explanation
			and growing pressures on existing grazing land, smallholder farmers are increasingly grazing livestock in forested areas. Similar to crops, however, livestock production is not considered suitable as the basis for a PES scheme given its largely subsistence nature and potential conflict with forest protection. This might be mitigated by employing a rigorous system of grazing management, but would likely depend on a "zero encroachment on forest resources" approach being enforced, however no such system currently exists. This would also need to take account of PELIS and other similar schemes in the area (e.g. the Kenya Carbon Agricultural Project – see Table 3).
	Timber and other fibres (sustainable provision of wood and non-wood forest products)	Moderate/High	Mount Elgon's forest ecosystems provide wood, timber, thatch, and other fibres for both domestic consumption and sale. The timber industry also supports a number of jobs in the local economy, and the industry is dominated by small saw millers and traders. If sustainably managed, forest ecosystems could be expanded to provide greater forest cover as well as providing income and jobs within the area, providing a basis for a potential PES scheme. This could, for example, take the form of the introduction of Sustainable Forest Management standards such as Forest Stewardship Council (FSC) or the development and implementation of a bespoke set of standards endorsed by the Programme for the Endorsement of Forest Certification (PEFC). Such a move would, however, have to be considered within the context of the existing ban on logging in public forests. The role of exotic versus endemic/native tree species in sustainable forestry for Mount Elgon would be a key factor for consideration. For the purposes of this study, it is assumed that the overarching goal of sustainable forestry and sustainable provision of wood and non-wood forest products would be to manage Mount Elgon's forested woodlands and ecosystems in a manner that maintains/enhances ecological integrity and processes that ensure there is a sustainable balance in ecological interactions. Bamboo is of localised but high importance in the Mount Elgon region. Stems are harvested for a range of purposes, including construction, stakes for growing crops such as beans and bananas, and for weaving into granaries and baskets (Scott, 1998). Moreover, the National Bamboo Policy (2019) encourages the expansion of bamboo cultivation to support income diversification, ensure the sustainable supply of feedstock to artisanal and large-scale industries, improve soil quality and other ecosystem services, and contribute to climate change mitigation (Government of Kenya, 2019). The policy does, however, recognise that markets for bamboo products are largely underdeveloped due to a lack of mature domestic markets for products, as well as a lack of consumer awareness and confidence. In this light, the development of a PES scheme around bamboo production may be premature but could potentially be considered in future.
	Wild foods (flora and fauna)	Low	Studies indicate that most products collected from the forest by forest-adjacent households are for domestic consumption or sale, while some act as an input into other household activities. Wild foods harvested in the area include honey, game meat, salt lick, fruits and medicinal plants. Given the limited beneficiaries of this service, wild food production is unlikely to secure the revenues required to support a PES scheme in its own right although could provide

Type	Ecosystem service	Priority based on provision & potential for inclusion in PES	Explanation
			an important co-benefit of forest management and creation.
	Energy	Low	Mount Elgon's forests provide an important source of biomass (charcoal and fuelwood) for meeting the energy needs of households and small-scale industries. The extent of this use means that the harvesting of trees for use as fuelwood is one of the key drivers of deforestation in the area and, as such, there are potentially important trade-offs between the provision of this service and other forest services. Supporting access to sustainable sources of biomass energy through forest management and creation should be an important co-benefit/component of a PES scheme on Mount Elgon but the potential trade-offs or perverse incentives that could arise through a PES scheme centred on fuelwood or charcoal make it higher risk and unlikely to be appropriate as the basis of a scheme.
	Genetic materials (flora and fauna)	Moderate	Mount Elgon's endangered and threatened species as well as its rare cave-dwelling elephants offer the potential to engage research institutions in protecting these areas. This service is covered under 'Scientific and educational value' and 'Wild species diversity'.
	Water supply (surface and groundwater)	Low	Suitability of a PES scheme for water supply (quantity) linked to forest restoration and management is complex. However, previous studies suggest that this ecosystem service is one of the most important for local communities (Langat et al, 2019; Sumukwo et al., 2011). While forests play an important role in the regulation of water supply, the science of cause and effect and who benefits is complex and requires detailed modelling and assessment of surface, groundwater and atmospheric interactions. This makes the design of a PES scheme around this issue challenging to implement. It is therefore recommended that further research is undertaken to better understand the specific role of forests in watershed regulation within Mount Elgon before it is considered to form the basis of a potential PES scheme.
Regulating	Pollution mitigation (including air quality, noise mitigation, visual screening)	Low	Forests and habitats can improve environmental quality through the absorption of pollutants from the atmosphere, soils and waterways. The role of vegetation in absorbing pollution tends to be most beneficial where there are large numbers of people exposed to air pollution from transport and industry. Local communities did not rank this service as a key threat/issue in the area (Langat et al., 2019). Across the Mount Elgon region, the extent of air quality regulation by forest ecosystems is unlikely to provide a basis for a potential PES scheme, although in certain areas forest management and habitat restoration and creation could provide important co-benefits for air quality. Dense forests could also serve as a noise and visual barrier although the value of this service would be limited to those who are directly affected by noise and visual disamenity and who would be willing to pay to reduce these impacts. Given the predominately rural nature of the environment with no major transport infrastructure or industry, the demand for such a service is likely to be low and therefore insufficient to support a PES scheme.
	Hazard regulation (erosion, wind, fire, flooding)	Moderate	In the past, landslides and floods initiated by high rainfall and land degradation in the Mount Elgon area have threatened lives and destroyed property (Musau et al., 2014). Forest fires in the area also threaten habitats and the ecosystem services they provide (Nyongesa, 2015). In several cases, the forest has been cleared for crop farming on sloping land (unsuitable for agriculture), leaving the land susceptible to erosion and landslides. A number of studies

Type	Ecosystem service	Priority based on provision & potential for inclusion in PES	Explanation
			(e.g. Otuoma et al., 2011; Government of Kenya, 2010) have highlighted the impact that climate change in forested areas in Kenya is likely to have on rainfall patterns and the increased risk of downstream flooding, with some studies presenting evidence that this is already occurring in areas around Mount Elgon (Kansiime et al., 2013; Government of Kenya, 2010) and is likely to be further exacerbated by the effects of further climate change (Olago et al., 2015). Furthermore, flooding around Lake Turkwel has also been linked to prolonged periods of heavy rainfall in Mount Elgon (Floodlist, 2020) although the lack of rainfall data for Mount Elgon makes this difficult to confirm (Munday et al., 2020). Ecosystem-based adaptation has been proposed as a measure to protect against future flooding, landslides and erosion (Olago et al., 2015) with some measures already having been implemented on the Uganda side of Mount Elgon under the USAID-funded Resilience Framework for Climate Change (RFCC) under the Lake Victoria Basin Project (2012-2015). The protection and restoration of the forest ecosystem has the potential to support the delivery of hazard regulation services including erosion, wind, fire and flood control but more detailed modelling and assessment would be required to establish the specific actions that would need to be undertaken, and where, and who the primary beneficiaries of those activities would be. As such, the immediate prospects for a PES scheme centred around hazard regulation are considered moderate.
	Pollination and seed dispersal	Low	Although natural pollination and seed dispersal is present within Mount Elgon and supported by habitats, the beneficiaries are likely to be primarily local subsistence farmers who would need to implement the actions necessary to enhance pollination and seed dispersal services. As such, this ecosystem service is not considered suitable to form the basis of a PES scheme in Mount Elgon although it could be a valuable co-benefit of measures to improve land management in the area.
	Pest and disease control	Low	Similar to pollination, although pest and disease control is likely to be supported and delivered by Mount Elgon habitats, it is not evident who the specific buyers and sellers would be and the willingness to pay for the adoption of measures to enhance this service is likely to be limited to commercial enterprises, and only where it can be demonstrated that natural pest and disease control measures are effective and of sufficient strategic significance in the area to form the basis of a potential PES scheme.
	Soil quality regulation	Low	Soil regulation is an important ecosystem service in the area, linking to the provision of crops, land for grazing livestock and wild foods. Mount Elgon has relatively high levels of forest cover and the level of soil erosion is of lower concern than in other areas of the country. In addition, the provision of soil regulation would be covered within the 'Crops (food) and livestock' and climate regulation (for carbon storage) ecosystem services. It has been therefore assessed as being of low suitability for the development of a potential PES scheme.
	Water quality regulation (surface and groundwater)	High	Establishing the suitability of a PES scheme for water quality linked to forest restoration and management is a complex undertaking, requiring detailed land cover change and hydrological modelling and assessment. However, existing studies found that this ecosystem service is one of the most important to local communities (Langat et al., 2019; Sumukwo et al., 2011). Natural vegetation and ecosystems provide clean water from nonpoint sources through the

Type	Ecosystem service	Priority based on provision & potential for inclusion in PES	Explanation
			process of natural filtration, which regulates water flow, improves water quality, and prevents erosion, mitigating downstream eutrophication, toxic algal blooms, deoxygenation, and fish kills that affect human health, water treatment costs, and local economies. Forested watersheds prevent surface runoff by enabling subsurface groundwater recharge, consequently reducing the kinetic energy of flows and increasing the ability of the system to release water over time. Water flow regulation and storage can also prevent the siltation of dams and infrastructure and reduce flood damage, both of which are known to be issues at the Turkwel Gorge dam which lies at the bottom of the Mount Elgon catchment.
	Global climate regulation (carbon storage and sequestration)	High	Mount Elgon's forest habitats store and sequester carbon from the atmosphere. There is strong precedence for PES scheme development around this ecosystem service, especially in regard to carbon sequestration, while the demand for carbon offset credits from international buyers has strengthened in recent years, and continues to grow, as businesses adopt net zero targets and plans which necessitate investment in nature-based solutions alongside decarbonisation of the economy. Forest enhancement and/or restoration activities could also increase the provision of water quality regulation, hazard regulation and wild species diversity (biodiversity) as important carbon co-benefits.
	Local climate regulation	Low	Forests can influence temperature, wind speed, and precipitation patterns at a local and regional scale although the evidence for a quantifiable link between changes in forest cover and changes in the regulation of these services is limited (Von Holle et al., 2020). For this reason, local climate regulation has been assessed as less relevant for a potential PES scheme.
Cultural	Recreation and tourism (including heritage and culture, and aesthetic value)	Low	A study by Langat et al. (2019) found that tourism in Mount Elgon is not perceived to be important to local people, mainly because local communities do not perceive any direct link between international tourism and their well-being. Forest conservation for tourism has been promoted as a means of earning foreign exchange and therefore perceived to benefit only the Government and foreigners (Langat et al., 2019). Nevertheless, the potential may exist to structure a PES around nature-based tourism whereby foreign visitors contribute towards the conservation of the Mount Elgon ecosystem through a 'visitor giving' scheme based on voluntary payments targeted towards conservation and support of community-based tourism enterprises. In this way, payments could also indirectly support the protection of biodiversity – this is explored in more detail under the 'biodiversity' ecosystem service. While the number of tourists to Mount Elgon is relatively low (e.g. compared to some of the other National Parks and Reserves), there is potential for this sector to develop overtime as infrastructure (a key challenge for the industry) is developed, including improving connectivity to key transport hubs (airports and tourist gateways). In addition, tourism to the Mount Elgon region is estimated to have low and/or negligible value to the local economy (Langat et al., 2019). It is noted, however, that a potential PES scheme which enhances the ecosystems of Mount Elgon may serve to increase its recreational and tourism value and attract a higher number of visitors to the region. For this reason, a tourism-based PES could be viable in future, and should be evaluated as the development of this market progresses.

Type	Ecosystem service	Priority based on provision & potential for inclusion in PES	Explanation
	Scientific and educational (including informative entertainment)	Moderate	Forest ecosystems support a range of traditional knowledge practices in the local area as well as providing opportunities for scientific research. Historic and cultural assets as well as unique, endemic and threatened species within Mount Elgon make it a particularly valuable scientific and educational resource. Mount Elgon's cave systems have a long history of occupation with relatively recent research providing the first evidence of anatomically and technologically modern human behaviour in this topographically elevated region of East Africa (Kinnaird et al., 2014). While the scientific, educational and knowledge services value of the area are important, it is less likely that they could be commodified and traded in a PES scheme. As such they are likely to be valuable co-benefits associated with forests managed, restored and created for other services, including tourism.
	Sacred and/or religious	Moderate	While sacred and/or religious services are likely to be present it is unlikely that they could be commodified and traded in a PES scheme. As such they are likely to be co-benefits associated with forests managed and restored for other services. In addition, local communities did not indicate this to be a key ecosystem service as reported in Langat et al., 2019.
Supporting	Wild species diversity (biodiversity)	High	Mount Elgon supports a wide range of wild species. It is home to 37 globally threatened species and 9 endemic species, including 240 documented bird species (Langat et al., 2019). Furthermore, the presence of rare cave elephants may be more likely to attract landscape-scale funding and, as such, wild species diversity may be applicable to form the basis of a potential PES scheme. There is also the potential to structure a biodiversity-based PES around nature-based tourism whereby foreign visitors contribute towards the conservation of the Mount Elgon ecosystem through a 'visitor giving' scheme based on voluntary payments targeted towards conservation and support of community-based tourism enterprises.

It is important to note that the assessment undertaken at this stage is a high-level prioritisation exercise for the purposes of outlining the initial scope of a potential scheme. This does not mean that PES schemes centred around other ecosystem services are necessarily unsuitable, but rather that the services identified here are priorities for initial scoping exercises as they appear to have the highest likelihood of supporting successful PES schemes at this stage. The assessment is not intended to be exhaustive and should be revisited and, if necessary, revised once data has been collected during scheme design and implementation. Given these considerations, the next steps of this scoping study will set out a more detailed assessment of the four services identified as the highest priorities for PES:

- Timber (sustainable provision of wood and non-wood forest products);
- Water quality regulation;
- Global climate regulation (carbon sequestration); and
- Wild species diversity (biodiversity).

Given the importance of farming for the local communities, tree planting on cropland and agroforestry activities were also assessed for their potential to contribute to a potential PES (see Appendix A). Other services that offer potential, but which either require more detailed primary research or modelling than it has been possible to conduct here, or which are dependent upon future forestry policy and regulation, include:

- Water supply[11];
- Hazard regulation (flood and erosion control); and
- Recreation and tourism.

3.3 Feasibility assessment

The feasibility assessment aims to explore the estimated costs and benefits of a potential PES scheme focused on each prioritised ecosystem service. There are a variety of assumptions and methods used, detailed in the following subsections, which could be updated in Stage 2 as needed. It should be noted that with any potential PES scheme, focusing solely on maximising one service could risk trading off functioning ecosystems and the delivery of other services, leading to unintended negative impacts (Seddon et al., 2020). Failure to recognise co-dependencies, benefits, and costs in pursuit of a single objective may increase the likelihood of detrimental land use and policy (NCC, 2020; Fripp, 2014). Well-designed PES schemes should therefore recognise the ecosystem as a whole, carefully consider design and management elements including species composition – e.g., with a focus on diverse, native species - and avoid damaging ecosystems. Additional considerations are further detailed within each subsection (where relevant) and can help to support the next stages of PES design and implementation.

3.3.1. TIMBER (SUSTAINABLE PROVISION OF WOOD AND NON-WOOD FOREST PRODUCTS)

The forest ecosystem at Mount Elgon supports the production of a range of forest products including timber, fibre, thatch, medicine, charcoal and firewood for both domestic consumption and sale. The forestry industry is dominated by small-scale enterprises which employ at least one member from

[11] While forests play an important role in the regulation of water supply, the science of cause and effect and who benefits is complex and requires detailed modelling and assessment of surface, groundwater and atmospheric interactions. This makes the design of a PES scheme around this issue challenging to implement. It is therefore recommended that further research is undertaken to better understand the specific role of forests in watershed regulation within Mount Elgon before it is considered to form the basis of a potential PES scheme.

around 5% of all households on Mount Elgon (Langat et al, 2019).

The gazetted forest area, which traverses Bungoma and Trans Nzoia counties, has eight forest stations namely: Cheptais, Kaberwa, Kaboiywo, Sosiyo, Suam, Saboti, Kimothon and Kip-togot.

The forest ecosystems on Mount Elgon are protected and managed by the KWS and KFS, with KWS managing the National Park. The management of forest resources in Kenya is guided by the National Forest Policy supported by the Forest Act. The KFS under the Ministry of Environment and Forestry is responsible for all of Kenya's gazetted forests. The aims of both KFS and KWS are to support sustainable management of forests and the conservation of the natural environment and its flora and fauna for future generations, respectively (Ongugo et al., 2010). Both organisations also aim to share some portion of proceeds from activities (e.g. tree growing, tourism) with local communities.

As deforestation continues, the concept of what constitutes sustainable forest management are continuing to develop globally and is open to many interpretations Chisikia and Yeom, 2021; Adger and Jordan, 2009; Redclift, 1997). Sustainable forest management should shift the focus of forest management from wood production to the production of other forest resources and ecosystem services including biodiversity. In contrast with traditional wood-based forest management approaches, sustainable forestry aims to incorporate social, economic, and environmental goals in forest management (Chisikia and Yeom, 2021). Ongoing discourses in the scientific community are also fast converging on other concepts such as ecologically sustainable forest management (ESFM). ESFM refers to the regeneration and restoration of natural forests by targeting all ecosystem and forest components (Chisikia and Yeom, 2021).

For the purposes of this study, it is assumed that the overarching goal of sustainable forestry and sustainable provision of wood and non-wood forest products are to manage Mount Elgon's forested woodlands and ecosystems in a manner that maintains/enhances ecological integrity and processes that ensure there is a sustainable balance in ecological interactions. It should be noted that this goal has likely implications for the activities as well as species that would be included within sustainable management of the forest. For example, the use of exotic versus endemic/native tree species, which can risk trading off functioning ecosystems and habitats for monocultures or low diversity plantations that are vulnerable to pests, disease and climate extremes which may exacerbate water scarcity in arid or semi-arid regions (Seddon et al., 2020).

As the majority of forest within the area is protected and managed by KFS, this section focuses on existing research which identifies key considerations for the sustainable management of forestry and whether/how sustainable forestry activities can link to a 'bundled' PES scheme whereby payments for additional ecosystem services are received. This includes the potential for a sustainable forestry certification, which does not function as a PES in the strictest sense, as there is no direct contract between buyers and sellers, but payments are conditional – the fact that the timber is certified as having been produced to a certain standard is the condition upon which buyers will pay for them.

Supply

According to research carried out by Langat et al. (2019), timber used by forest-adjacent households in the region is mainly sourced (40.9%) from the household's own farms, with 26.3% from the market, 22.3% from public forests and 10.6% from neighbours (see

Table 6).

Table 6: Sources of wood products used by forest-adjacent households in the Mount Elgon ecosystem

Sources (%)				
Product	Market	Neighbours	Own farm	Public forest
Timber	26.3	10.6	40.9	22.3

Source: Langat et al. (2019)

However, of the sources of raw wood material for use in industry, only 12% comes from private farms and 88% comes from the public forest (see Table 7). This indicates that the timber produced on private farms is primarily for subsistence use.

Table 7: Sources of raw wood material (%) for use in forest industry

Sources of raw wood material (%)	
Public forest	Private farms
88%	12%

Source: Langat et al. (2019)

A list of the main tree species (non-exhaustive) on Mount Elgon, together with information on their respective management options and rotation, and end uses is provided in Table 8. Currently, the main wood products sourced from the public forests are cypress or pine logs, while eucalyptus which is used primarily for energy transmission and fencing poles is mainly sourced from private farms (Langat et al. 2019).

Table 8: Example list of species found on Mount Elgon (non-exhaustive)

Tree Species	Endemic	Native	Common Name	Management Options	End Use	Rotation
Casuarina equisetifolia	No - Invasive	Australasia	Whispering pine	Plantation /agroforestry	Timber, fuel, amenity, fibre, medicinal, tannins	Short (4-6 yrs)
Eucalyptus regnans	No- Introduced	Australia and Tasmania	Mountain ash	Plantation /woodlots	Fuel, poles, Timber for use in construction	Short (4-6 yrs-poles) (10-20 yrs for timber)
Arundinaria alpina	Yes	East Africa	Bamboo	Plantation, boundary, groves, soil protection	Building, fencing, handicraft, soil protection	Short (6-10 yrs)
Acacia melanoxylon	No - Introduced	Australia	Black wood	Plantation/mixed planting	Soil conservation, timber, fuel	Short (8 yrs) (30 yrs timber)
Cupressus lusitanica	No - Introduced	Central America	Cypress	Plantation	Timber, hedges and shelter belts	Short (25–30 yrs)

Source: Kenyan Ministry of Environment and Forestry (2018) and MEEP technical experts

The forest also provides important ecosystem services such as non-timber forest products (e.g. honey, fruits, and medicines), carbon sequestration, soil erosion control, and habitat for a diverse range of wild species. In this way, sustainable forestry practices that are certified to a recognised standard (e.g. PEFC or FSC) could directly link to a bundled PES.

The forest ecosystems also contribute to food security through KFS's PELIS Scheme, whereby farmers are allocated land in plantation areas after harvesting. Local communities are allocated one acre land parcels for the cultivation of annual crops, intercropped with trees for periods of two to three years. The total value of Mount Elgon, Mau and Cherangany ecosystems to food production through PELIS is KES 635 million per year (Langat et al., 2019). The total value excludes the value of food products sourced from the forest by households for domestic use, including honey, meat, mushrooms, and fruits.

In 2018 the Kenyan Government imposed a logging ban to regenerate forests and bring about reforms in forest management, which caused Kenya's timber supply to decrease and imports of wood products to rise (Collins, 2020; KEFRI, 2020).

Demand

Table 9 presents estimates of the annual quantity and value of forest products extracted by households on Mount Elgon as presented in Langat et al. (2019). These values are based on detailed household surveys conducted on Mount Elgon. As shown, local communities depend on the forest for a wide range of goods and services with an estimated annual value of over KES 3 billion (USD $34 million). Wood products including charcoal, firewood, poles and timber make up an estimated 50% or KES 1.5 billion (USD $15.5 million) of that value.

Table 9: Annual estimated quantity and values of forest products extracted by households on Mount Elgon

Forest Products	Units	Quantity (households/yr.)	Aggregate annual value (KES)	Present Value (KES)	Aggregate Annual Value (USD)
Agricultural tools	No.	93	76,102,335	1,087,176,214	761,023
Animal browse	No.	386	138,347,541	1,976,393,443	1,383,475
Animal fodder	Hay equivalent	226	956,673,263	13,666,760,900	9,566,733
Charcoal	Bags	28	181,538,745	2,593,410,643	1,815,387
Fibres	Feet	4,683	11,969,635	170,994,785	119,696
Firewood	Bundle	175	482,308,193	6,890,117,043	4,823,082
Fruits	No.	3,393	592,815	8,468,786	5,928
Honey	Kg	21	115,082,148	1,644,030,686	1,150,821
Meat	Kg	9	16,996,108	242,801,543	169,961

Forest Products	Units	Quantity (households/yr.)	Aggregate annual value (KES)	Present Value (KES)	Aggregate Annual Value (USD)
Herbal Medicine	KES (WTP)		46,848,326	669,261,800	468,483
Murram/soils	Wheel barrow	104	88,421,877	1,263,169,671	884,219
Mushrooms	Pieces		60,199,640	859,994,857	601,996
Poles	No.	532	847,733,944	12,110,484,914	8,477,339
Thatch grass	Bags	765	13,733,809	196,197,271	137,338
Timber	Feet	151	36,905,034	527,214,771	369,050
Water (domestic and livestock)	Litres	17,117	366,165,973	5,230,942,471	3,661,660
Total			3,439,619,386	49,137,419,798	34,396,191

Source: Langat et al. (2019)

The majority of forest products on Mount Elgon are used for subsistence purposes – including firewood which represents the single energy source for the majority of households in the forest-adjacent communities (USAID, 2021; Langat et al, 2019; UNEP, 2012; Ongugo et al., 2010).

Statistics for Kenya's forestry and logging industry show the industry's average annual gross value added[12] was 102,605 million KES between 2015 and 2019, with an average increase of 12% per year, likely indicating an increase in demand during this time (Kenya National Bureau of Statistics, 2020). Following the logging ban in Kenya, some estimates show demand for wood products outstripping supply, and the situation was exacerbated by value chain challenges (Collins, 2020).

The logging ban has also reportedly affected key forestry public institutions with Kenya Forest Service losing an estimated KES 2.75 billion per annum in revenue from plantations (KEFRI, 2020). This could point to the need for new policies or ways to sustainably manage forest resources, including mechanisms such as PES and/or certification against a recognised or accredited sustainability standard.

It is reasonable to assume that the demand for Mount Elgon timber and wood products will increase in future given the predicted increases in population and demand for sustainable construction materials. For example, bamboo is becoming an increasingly important global resource due to the fact that it has a range of commercial uses; it is cheap, highly productive, and fast growing.

Information available therefore suggests demand for timber production to increase in the area in future. The actual level of demand will depend on localised circumstances and the nature of support

[12] Gross value added (GVA) is a measure of output which provides a dollar value for the amount of goods and services that have been produced in a country, minus the cost of all inputs and raw materials that are directly attributable to that production (Investopedia.com).

and infrastructure provided. These issues could be explored in more depth in Stage 2.

Feasibility

With most of Mount Elgon's forest under the protection and management of government departments aiming to drive sustainable forest industries, it is difficult to assess the feasibility of additional mechanisms such as PES to further drive sustainable management and conservation. This assessment does not therefore attempt to assess the costs and benefits of existing government led sustainable forest management and/or conservation work on Mount Elgon and the extent to which they could or should be expanded.

However, existing sustainable forestry activities in the area suggest forestry PES schemes are feasible. For example, KFS and Iber Africa (EA) Limited signed a Framework for Collaboration that will see the two organizations partner in the rehabilitation of Cheptais forest station in Mount Elgon through tree growing. The collaborative framework was signed between the Chief Conservator of Forests Mr Julius Kamau and Iber Africa's CEO Mr Henry Kanji. Iber Africa is a thermal generating power company, an Independent Power Producer (IPP) in Kenya and will also purchase carbon credits through the partnership (KFS, 2021).

The ban on logging is a complex policy which greatly impacts this sector. The promotion of sustainably produced timber may require initial support and investment from the Kenyan Government to enable the sector to develop. This might include, for example, strengthening infrastructure for harvesting, transporting, and processing sustainable wood products and, more importantly, working with producers to select (or develop) an appropriate forest management standard against which sustainable forest management plans can be independently validated and their implementation independently verified before certification can be achieved. This would also require support from the Government of Kenya to promote awareness of and demand for timber that has been sustainably produced. Further consultation with stakeholders would therefore be required in Stage 2.

Research suggests that local communities will require continued access to wood and non-wood forest products from the forest. This demand would increase as population increases overtime. It is now recognised that greater community participation in forest management can reduce the over-exploitation of forest resources, and that conservation of environmental resources can only succeed if the social factors, which influence people's interaction with the environment, are addressed (Ongugo et al., 2010).

In recognition of this, KFS is also seeking partnership opportunities for funding to work with the community in formulating Participatory Forest Management Plans and establishing and strengthening community forest associations (CFAs). Through these associations, the communities work with KFS in restoration, management and protection of the forest while also benefitting through non-extractive income generating activities such as the establishment of apiaries, recreational and ecotourism facilities (KFS, 2021).

Maintaining existing forest, for example by avoiding forest degradation and deforestation through the creation of substitute sources of wood products and agricultural commodities, could also be considerably cheaper and quicker to apply than restoring forest once it has been cleared, as illustrated in the findings of a study undertaken in Madagascar by Busch et al. (2012).

Based on the information reviewed, it may be concluded that sustainable forestry could be an important component of a packaged-PES scheme. The logging ban provides an opportunity for the Government to undertake a reassessment of the entire Kenyan forest sector. It is clear that demand for timber products and non-timber forest products is strong and is likely to increase. A reimagining of Kenya's forest sector could include a PES or a related scheme that supports the sustainable

management of forests to meet demand going forward by providing suitable and sustainable incentives for land managers to engage in more sustainable land and forest management practices.

For example, there are more than 50 certification schemes related to the management of forests (Dasgupta, 2017). In the UK some 43% of the country's forest sector is Forest Stewardship Council (FSC) certified forests or products.[13] This certification applies to forests which align to a set of principles and criteria including around workers' and indigenous people' rights, compliance with laws, conservation and management. These principles and criteria are meant to maximise the wider environmental and social benefits being delivered alongside the forest management. Some studies suggest that certified wood products may achieve a price premium in the market, and, in this way, forestry managed to a high standard may recoup the costs of that management, however there is conflicting evidence around this (for example see Dasgupta, 2017). It is likely that some form of government payment (or subsidy) would be required to implement widespread certification across the country. Alternatively, forestry management activities could be linked to a PES scheme focused on other ecosystem services (e.g. water quality regulation, carbon sequestration and/or biodiversity) where the supply of those services (and payment for them) is conditional upon the implementation of more sustainable forest management activities.

The reassessment of the forestry industry in Kenya could also consider wider findings from KEFRI which include: review of current licensing of forest logging, fast tracking forestry sector reforms to create good governance structures, development of an effective monitoring system to ensure sustainable management of forest resources and promoting investment in secondary forest products processing for wealth creation and employment (KEFRI, 2020). It is likely that these actions would be aligned with actions necessary under any sustainable forest management standard.

3.3.2. WATER QUALITY REGULATION

Forest ecosystems bind together soil particles and reduce soil erosion which can regulate sediment levels and nutrients entering watercourses within a catchment. Afforestation, reforestation and forest conservation can therefore potentially provide valuable benefits to downstream water users who are reliant on clean water supplies such as dam operators, water supply companies, beverage producers (bottling plants), and fisheries.

Supply

As a water tower there are a number of projects (for example, Nadir et al, 2019; KEFRI, 2018; KWTA, 2018; Musau et al., 2015; and on-going research by CIFOR) that have looked at water quality, soil, sediment, land management, and stakeholder engagement in the Mount Elgon catchment. However, this review did not find any studies that have looked specifically at developing the evidence base for implementing a PES scheme, and critically, identifying a causal link between afforestation activities and sediment levels in the catchment. In light of this, the WaterWorld[14] modelling tool was used to define the hydrological baseline of Mount Elgon and to quantify the role that forests play in regulating water quality through reductions in sedimentation and runoff.

Figure 10 presents an overview of the Mount Elgon watershed from the WaterWorld tool summarising elevation, slope gradient, human footprint on water quality, and mean annual rainfall. The human footprint on water quality (HFWQ) is an indicator of relative potential contamination. Water quality is affected by any potentially polluting land uses, including croplands. The HFWQ is the percentage of runoff at any point that fell as rainfall on potentially contaminating land uses upstream (urban, roads,

[13] For more information see: Forest Stewardship Council.
[14] For more information see: http://www.policysupport.org/waterworld

mining, oil and gas, pasture and croplands). HFWQ changes downstream as it passes into the main cropland areas. As shown in Figure 10, the HFWQ remains relatively low, but is highest in areas corresponding with cropland areas in the northeast, southeast, and southern boundaries of the study area. The effect of the croplands on water quality is diluted as higher quality water from natural land covers enters the channels thus diluting potential contaminants in the watercourses. The existing vegetation in Mount Elgon secures this resilience to potential contamination in the area.

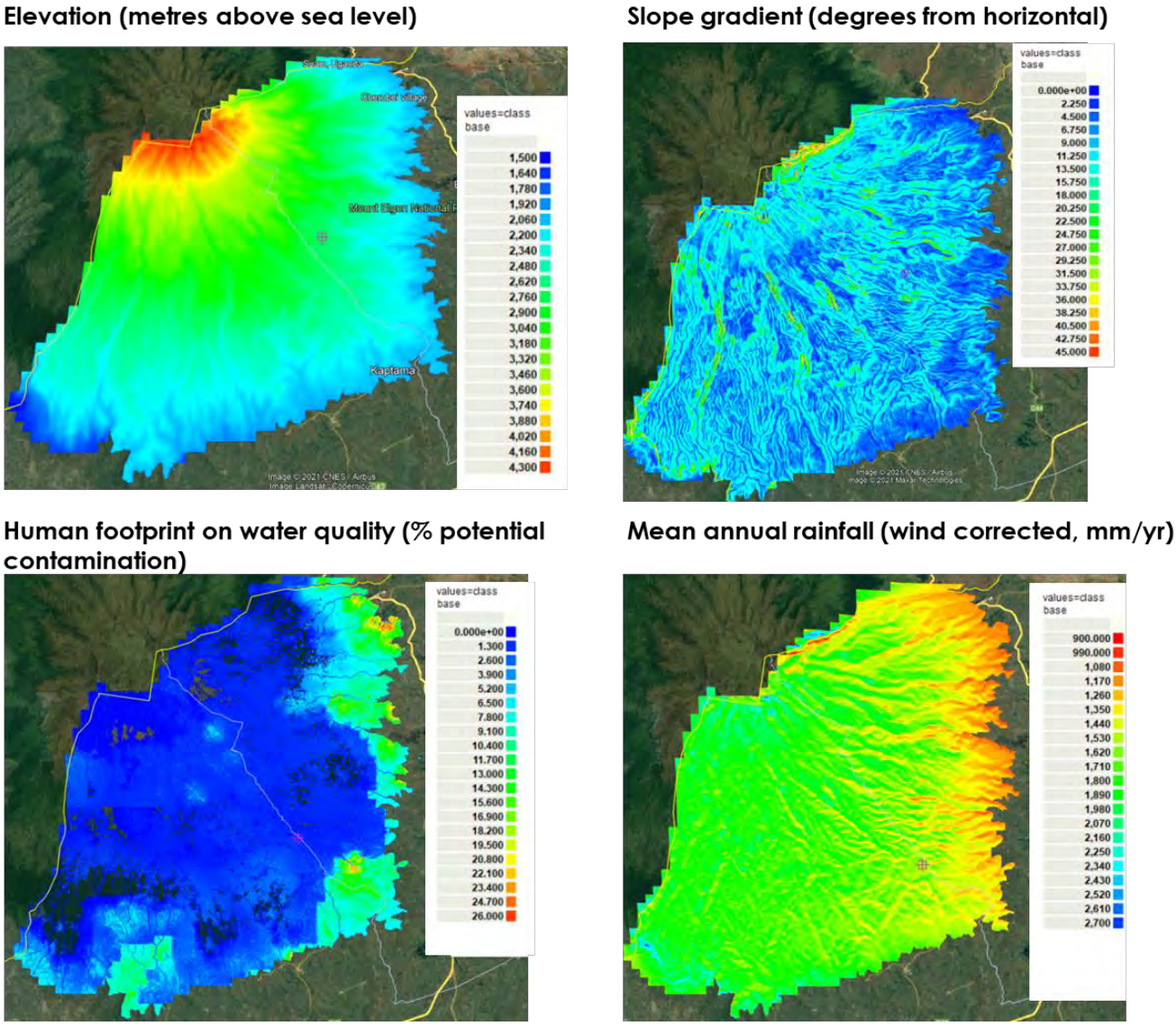


Figure 10: Overview of Mount Elgon watershed

Source: WaterWorld Tool (2021)

A scenario analysis was conducted to estimate the impact on sedimentation and runoff of afforestation on cropland areas. The parameters used for the afforestation scenario are presented in

Table 10 below.

Table 10: Parameters used to assess water quality feasibility for PES at Mount Elgon

Parameter	Value	Explanation
Area of afforestation	11% tree planting per hectare of current cropland	Based on Mount Elgon farmer responses from Sumkowo et al. (2011)
Cropland areas included	Only areas where cropland land use is greater than 40% of a spatial area	Areas with >40% cropland were assumed to be medium to high intensity croplands. If a spatial pixel has >40% croplands, and 10% tree cover, in the scenario the tree cover is increased to 21% (10% + 11%). Most of the cropland areas have at least 40% cropland cover or above.

Figure 11 presents the WaterWorld effects of the afforestation scenario on runoff, fog deposition, and evapotranspiration. In general, the estimated impacts of the afforestation scenario are marginal. As the land cover changes from cropland to tree cover, runoff is reduced in some areas (i.e. in the east – where rainfall is relatively low) and increased in others (i.e. the southern area – where rainfall is higher) due to the influence of the estimated changes to fog deposition and evapotranspiration from afforestation.[15]

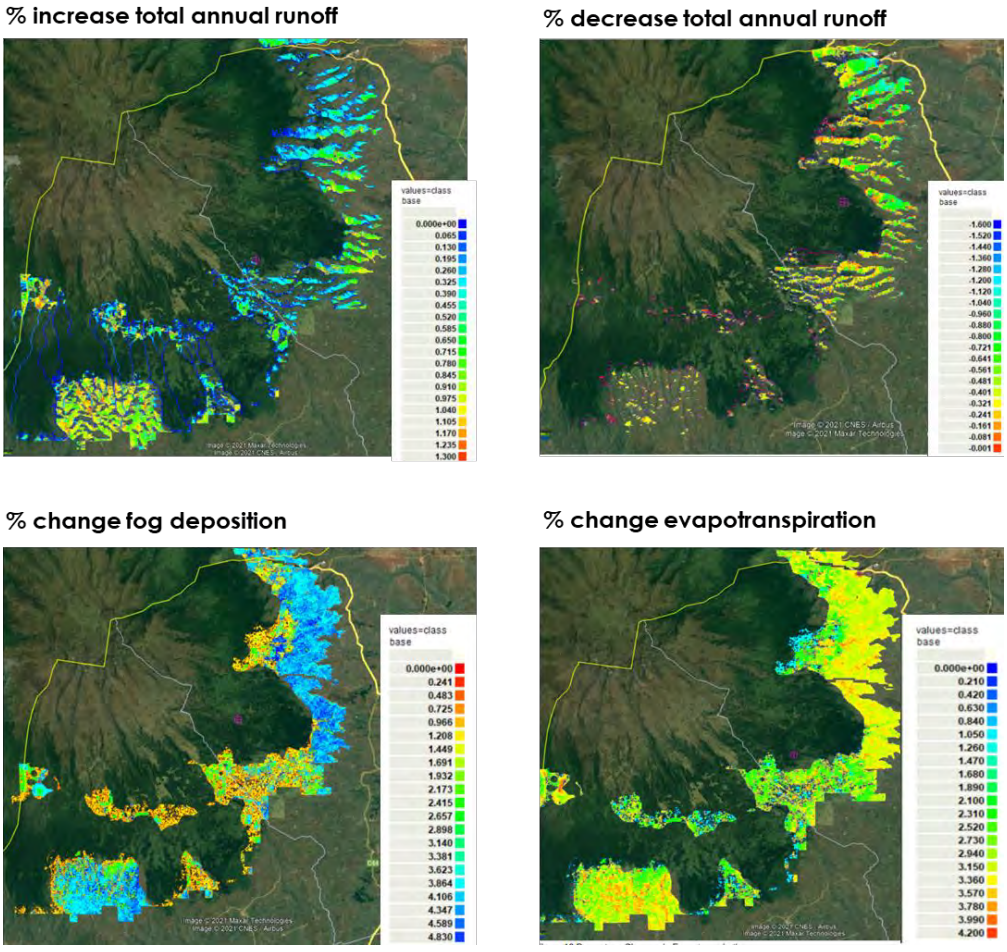


Figure 11: WaterWorld results for afforestation scenario

Source: WaterWorld Tool, 2021

[15] For more information on the dynamics between these parameters see: http://www.ambiotek.com/pss/pss_course_pres_2012.pdf

A further summary of overall results for Mount Elgon is presented in Table 11. In general, as a result of the afforestation scenario:

- Fog inputs increase due to the increase in tree cover in areas of high fog frequency.
- Actual evapotranspiration (AET)[16] decreases, due to the increase in tree cover.
- Runoff increases overall, because the increase in fog deposition outweighs the decrease in evapotranspiration.
- Net soil erosion decreases slightly overall because of increased soil protection provided by the enhanced vegetation cover.
- The maximum impact of the scenario on net soil erosion occurs in the two wettest months.
- The HFWQ metric, which is fairly low in the baseline, does not change significantly. The croplands, which are classed as a polluting land use, have been partly removed but this change is not enough to make a significant difference to water quality within the Mount Elgon study area.

Table 11: Key modelling results of changes – average for the whole study area (scenario-baseline)

Parameter	Average
% Change in annual total net soil erosion (erosion minus deposition from hillslopes and channels)	-0.07%
Difference in HFWQ (potential contamination)	0.00%
% Change in runoff	+0.03%
% Change in evapotranspiration	+0.73%
% Change in fog deposition	+0.88%

Demand

The afforestation scenario explored 11% afforestation per ha of medium to intense cropland on Mount Elgon. Due to the marginal impact of the afforestation scenario on runoff, sedimentation, and thus water quality, the demand for such impacts was not assessed further.

Feasibility

The water tower of Mount Elgon and its ecosystems provide clean water to nearly half a million people (KWTA, 2018). This analysis has found that the existing forest ecosystems and other vegetation support the resilience of water supplies from Mount Elgon to potential contamination and pollutants. Currently, ecosystems are providing water quality regulation services to a high level. Because of this, increasing tree cover on current areas of cropland does not have sufficiently significant impacts to serve as the basis for a PES scheme. However, this analysis finds that the continued protection, and potential enhancement, of existing ecosystems will protect water quality regulation which could be an important co-benefit arising from a bundled PES scheme.

[16] The amount of water that evaporates from the surface and is transpired by plants if the total amount of water is limited.

3.3.3. GLOBAL CLIMATE REGULATION – CARBON SEQUESTRATION

The natural environment is vital in facilitating global climate regulation due to its capacity to both store and take carbon out of the atmosphere through sequestration. Sequestration refers to the removal of CO_2 from the atmosphere through biological uptake – vegetation pulls CO_2 from the atmosphere as it grows – or natural inorganic reactions, such as soil nutrient and mineral cycling.

Healthy ecosystems, including forests, wetlands, peatlands and grasslands, sequester and store significant amounts of carbon in soils and vegetation. Efforts to protect, restore or improve the management of these ecosystems can reduce greenhouse gas emissions (GHGs) from ecosystems and harness their potential to store carbon. It is these aspects of ecosystems, among others, which contribute to them being referred to as 'natural climate solutions'. In fact, natural climate solutions (NCS) represent the only proven 'negative emission' technology with a long track record of working at a large scale, with the added benefit that they can also support climate adaptation and deliver a range of other ecosystem services. Enhancing, restoring and creating indigenous forest habitats to support the achievement of net zero carbon ambitions is therefore recognised as a priority in the immediate term as it does not require new technology to implement, and there is a time lag between starting work (i.e. planting) and seeing carbon reduction (and other) benefits (IPCC, 2019).

However, NCS focused solely on maximising GHG mitigation potential in the short-term risks trading off functioning ecosystems and habitats for monocultures or low diversity plantations that are vulnerable to pests, disease and climate extremes making them unable to maximise carbon storage in the long-term and which may exacerbate water scarcity in arid or semi-arid regions (Seddon et al., 2020). In contrast, well-designed NCS that incorporate diverse native species and avoid damaging ecosystems can support biodiversity, provide opportunities for recreation, and reduce flood risk, as well as supply (sustainable) timber or fuel. Failure to recognise co-dependencies, benefits, and costs in pursuit of a single objective may increase the likelihood of detrimental land use and policy (NCC, 2020; Fripp, 2014).

There are several ways in which the capacity of natural and semi-natural habitats to store and sequester carbon can be improved. Key activities identified as part of either compliance or voluntary carbon market schemes include:

- Afforestation and Reforestation – the land-use, land-use change and forestry (LULUCF) definitions under the Kyoto Protocol (annex to 16/CMP.1) define afforestation as the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources. Reforestation is defined as the direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period under the Kyoto Protocol, reforestation activities were limited to reforestation occurring on those lands that did not contain forest on 31 December 1989.
- Forest conservation through REDD+ – REDD+ is a framework created by the UNFCCC Conference of the Parties (COP) to guide activities in the forest sector that reduce emissions from deforestation and forest degradation as well as the sustainable management of forests and the conservation and enhancement of forest carbon stocks in developing countries.
- Forest management – is defined within LULUCF definitions as a system of practices for stewardship and use of forest land aimed at fulfilling relevant ecological (including biological diversity), economic and social functions of the forest in a sustainable manner.

Afforestation and reforestation can increase the amount of carbon stored within a particular area. Afforestation and Reforestation (A/R) projects for the purpose of climate change mitigation can be

registered through the Clean Development Mechanism (CDM) (see Box 3) or through private voluntary carbon markets (see

Box 4: Voluntary carbon markets – Reducing emissions from deforestation and forest degradation in developing countries (REDD+)

). The carbon credits generated can then be sold on international carbon markets providing the revenues needed to run the project and provide income for local communities.

Box 3: Afforestation and Reforestation projects under the Clean Development Mechanism

The Clean Development Mechanism (CDM) is one of three market-based mechanisms included under the Kyoto Protocol to the UNFCCC to help developed countries to reduce their greenhouse gas emissions while encouraging the private sector and developing countries to engage in emission reduction efforts (the other mechanisms being international emissions trading and joint implementation).

Under the CDM, developing countries can sell credits from emissions reduction projects (referred to as Certified Emissions Reductions or CERs) to developed countries with obligations to reduce their emissions under the Protocol. Projects generate a saleable credit for each tonne of greenhouse gases they sequester. While the CDM has incentivised the registration of more than 7,800 projects, with over 1.9 billion Certified Emissions Reductions (CERs) issued, Africa remains under-represented with just 2.8% of registered CDM projects (Luz Benites-Lazaro and Andrade, 2019).

In 2019, the CDM issued its two billionth CER, making it the largest carbon crediting mechanism by both cumulative issued credits and registered activities (World Bank, 2020). While it has over 250 methodologies on how to credit activities across a wide range of project types, over 75% of the credits issued by the CDM have come from just two sectors: industrial gases and renewable energy. The influence of the CDM has been in decline in recent years as global attention has shifted away from the Kyoto Protocol. The potential future role for CDM under Article 6 of the Paris Agreement, although finalised at COP 26 climate negotiations in Glasgow, is still to be seen as the Article is put into practice. Afforestation and Reforestation (A/R) is one of 15 sectors eligible to generate CERs under the CDM. The prerequisites for establishing an A/R CDM project include providing proof that the land in question was not forested for at least 50 years ('afforestation') or was converted to other uses before 31.12.1989 ('reforestation'). In particular, carbon sequestration through A/R must be additional to what would have occurred without the project; a project is not 'additional' if it is the most financially attractive among feasible options.

Despite considerable economic, social, and environmental opportunities, there are numerous barriers to the successful conception and implementation of A/R CDM projects. For example, due to the slow yielding nature of projects (i.e. long growth period of trees) and because forests do not sequester carbon permanently, A/R CDM projects generate temporary carbon credits (tCERs), the market for which is relatively limited. In addition, the capacity for carbon finance to frontload capital to cover the high upfront capital needs of forest projects is limited (indicating a potential need for government involvement).

However, notwithstanding the difficulties involved in establishing A/R CDM projects, Kenya is already home to at least five such projects[17]:

- Three of which are run by the Aberdare Range / Mt. Kenya Small Scale Reforestation Initiative. In 2007 and 2008 the Aberdare Range / Mt. Kenya Small Scale Reforestation Initiative committed to reforesting 1,649 hectares of degraded forest lands in the Aberdare Range and Mt. Kenya Regions in the catchment areas of the Tana River within the Aberdare and Mt. Kenya Reserve Forests (gazetted). According to available UNFCCC project design documents, the projects are operated by Green Belt Movement (GBM) on behalf of Community Forest Associations (CFAs) in association with the Ministry of Environment and Natural Resources, and KFS. The projects receive funding from the World Bank's BioCarbon Fund (BioCF).
- Two of which are run by KFS for the Ministry of Finance, Kenya. These include Restoration of Degraded Lands through Reforestation in MAU Forest Complex, and Reforestation in Aberdare Forest Complex & National Park area as part of the Plantation Establishment and Livelihood Improvement Scheme (PELIS) scheme. The proposed project activity involves reforestation of 8,813 hectares within Mau Forest Ecosystem, and reforestation of 1,694 hectares within the Aberdare Forest.

[17] For further information see project design documents provided by UNFCC for CDM Projects 3206, 3207, 5585, 9785 and 9789 here.

Box 4: Voluntary carbon markets – Reducing emissions from deforestation and forest degradation in developing countries (REDD+)

Unlike the CDM where verified CERs are sold through a UN-controlled market, voluntary carbon markets deal with the selling and buying of emission reduction credits (offsets) in markets that are not government regulated. In the case of voluntary markets, the demand for verified carbon credits is driven by voluntary customer demand. Buyers of carbon offsets may be the general public driven to reduce their carbon footprint from activities such as air travel. Companies and other emitting entities are participating in the voluntary market mainly to take action to reduce emissions above and beyond their legal obligations, to align with their own Environmental, Social, and Governance (ESG) targets and objectives or good stewardship[18], to brand themselves as green, or to hedge against future compliance obligations (UNFCCC, 2021).

Forest carbon markets encompass three main activities: afforestation, reforestation, and forest conservation. Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries (REDD+) is a framework negotiated under the UNFCCC to facilitate intergovernmental cooperation on forests and climate change. The aim of REDD+ is to encourage developing countries to contribute to climate change mitigation efforts by: i) reducing GHGs by slowing, halting and reversing forest loss and degradation; and ii) increasing removal of GHGs from the earth's atmosphere through the conservation, management and expansion of forests (FAO, 2021). Forests are vitally important for achieving the goals of the Paris Agreement, and the REDD+ framework is therefore recognized in Article 5 of the agreement (UNFCCC, 2021).

Most of the nationally determined contributions (NDCs) (or agreed efforts to reduce national emissions) submitted by countries also include land-based mitigation, and several NDCs submitted by developing countries explicitly refer to reduction of deforestation and enhancement of forest sinks, mainly through implementing REDD+ activities. The implementation of REDD+ activities can also contribute significantly to other global objectives, such as those agreed by the United Nations Forum on Forests, the United Nations Convention to Combat Desertification, the Convention on Biological Diversity, the UN Sustainable Development Goals and the UN Decade on Ecosystem Restoration (UNFCCC, 2021).

Voluntary carbon markets do have a number of potential aspects which provide a potential alternative to the sale of offsets through the CDM. In general, these schemes can cover a wider range of activities (compared to afforestation and reforestation under CDM), can be more flexible and innovative than is possible through the CDM, and can have lower transaction costs than offsets generated for use in mandatory compliance programs (offsetguide.org). Voluntary markets also serve as a niche for micro-scale projects that are too small to warrant the administrative burden of compliance offset programs. However, the lack of standardized quality criteria, in the early stages of the voluntary market, generated concern from the wider offset market. Certification Standards including Verra, and Gold Standard, help to address these concerns. Further, higher prices for credits can be secured through voluntary market schemes if there is clear evidence that an afforestation scheme provides significant co-benefits such as benefits to biodiversity or reduced flood risk.

According to Ecosystem Marketplace, prices vary as a result of factors including project type, location, offset age, the standard used to verify offsets, the motivations of buyers, the total volume transacted by suppliers and the existence of co-benefits. REDD+ and tree planting schemes command higher average prices than wind, landfill methane and clean cookstoves, possibly indicating a preference for offsets that encompass environmental and social co-benefits related to forest ecosystem services as well as increased costs associated with these land-based projects.

Currently, voluntary market credits are primarily being used by companies to offset part of their emissions or meeting voluntary commitments and this will likely increase and remain the largest use for carbon credits in the near future (World Bank, 2020). Therefore, as an alternative to the CDM, a carbon-based PES scheme in Mount Elgon could look at the potential for selling carbon offsets on voluntary carbon markets, aiming to demonstrate that the scheme provides significant co-benefits to biodiversity and communities in the area.

[18] Such as defined by the trade body for UK investment managers – the Investment Association's (IA) Good Stewardship Guide 2021.

Supply

The forest on Mount Elgon is under KFS management with the aims to provide "conservation, sustainable development, management and utilisation of the country's forest resources for equitable benefit of present and future generations."[19] As such, the existing forest is currently under a form of conservation management. For the purposes of this assessment we have therefore focused on afforestation and reforestation activities, however the results are also indicative of the benefits that may be achieved by continued forest conservation activities (i.e. those supported by REDD+ projects). This is because the estimates for the average amount of carbon sequestered and stored per hectare per year are likely to be similar whether the area is being afforested, reforested, or conserved. In general, the IPCC methods used in this analysis can also be used for REDD+ projects (although REDD+ projects are likely to use a different tier/more specific sequestration and tree species data) (IPCC, 2008). There are various Verra Voluntary Carbon Standard (VCS) methodologies that could apply and advice from a specialist could be sought to identify the most appropriate method. In addition, many of the costs of such projects would likely be similar - including implementation costs, monitoring and reporting costs.

The potential quantity of carbon sequestered by afforestation and reforestation within Mount Elgon was estimated using the IPCC's 'Good Practice Guidance for Land Use, Land-Use Change and Forestry' which is used by Parties to the United Nations Framework Convention on Climate Change's (UNFCCC) for estimating carbon stock changes and net greenhouse gas removals by carbon sinks when preparing GHG inventories. The IPCC guidance sets out three tiers of data that can be used to estimate potential carbon sequestration rates:

- Tier 1 is based on biome-averaged and default values for forest carbon stocks and contains the greatest level of uncertainty.
- Tier 2 uses country-specific forest carbon stock information with activity data at small scales.
- Tier 3 uses advanced estimation approaches with complex models and highly disaggregated data.

As this is the initial scoping stage of the PES Framework, the Tier 1 approach was used to estimate carbon sequestration values. Where possible, data was drawn from the design documents for the A/R CDM projects in Kenya which provide an indication of the potential values that may be observed in Mount Elgon assuming similar tree species and planting densities are used. It is expected that more detailed estimates of these values could be undertaken in Stage 2 of the PES Framework.

As set out in the IPCC guidance, the carbon sequestration potential of one hectare of forest on Mount Elgon was estimated using the following formula:

$$\Delta C_{LF} = \Delta C_{LF,LB} + \Delta C_{LF,DOM} + \Delta C_{LF,Soils}$$

Where: ΔC_{LF} is the annual change in carbon stocks in land converted to forest land; $\Delta C_{LF,LB}$ is the annual change in carbon stocks in living biomass in land converted to forest land; $\Delta C_{LF,DOM}$ is the annual change in carbon stocks in dead organic matter; and $\Delta C_{LF,Soils}$ is the annual change in carbon stocks in soils.

The IPCC guidance for the Tier 1 approach assumes that there is no change in dead organic matter or soil carbon stocks when land is converted to forest (although these changes are calculated in the Tier 2 and 3 approaches where more detailed data is available). Note, due to factors such as soil erosion in the area, the level of carbon in dead organic matter and soils is likely to decrease in the

[19] For more information on the vision and mission of KFS, see: http://www.kenyaforestservice.org/ .

absence of afforestation so results are likely to be conservative estimates of potential changes in carbon stocks.

Given that there is limited data available at this stage, the change in carbon stocks from afforestation was estimated on the basis of the change in carbon stocks within living biomass only (i.e. excluding carbon stored in soils and dead organic matter carbon). This was calculated using the following formula:

$$\Delta C_{LF,LB} = \Delta C_{LF,GROWTH} - \Delta C_{LF,LOSS}$$

Where: $\Delta C_{LF,GROWTH}$ is the annual increase in carbon stocks in living biomass due to growth in area under forest cover; and $\Delta C_{LF,LOSS}$ is the annual decrease in carbon stocks in living biomass due to losses from harvesting, fuelwood gathering, and disturbances in land converted to forest.

When measuring the annual increase in carbon stocks due to forest growth, a distinction is made between forests that are managed intensively (e.g. plantation forestry with intensive site preparation and fertilisation) and extensively (e.g. naturally regenerated forests with minimum human intervention). This is because the growth rate of a forest strongly depends on the management regime. The annual increase in carbon stocks due to forest growth was therefore estimated using the following formula:

$$\Delta C_{LF,GROWTH} = \left[\sum_{k} A_{INT\_MANk} * G_{Total\ INT\_MANk} + \sum_{m} A_{EXT\_MANm} * G_{Total\ EXT\_MANm}\right] * BG_{k,m} * CF$$

Where A_{INT_MANk} is the area of land converted to intensively managed forest in condition k; $G_{Total\ INT\_MANk}$ is the annual growth rate of biomass in intensively managed forest in condition *k*; A_{EXT_MANm} is the area of land converted to extensively managed forest in condition m; $G_{Total\ EXT\_MANm}$ is the annual growth rate of biomass in extensively managed forest in condition m; k and m are dummy variables for areas which are intensively and extensively managed respectively; *CF* is the carbon fraction of dry matter; and *BG* is the below-ground biomass correction factor.

The annual decrease in carbon stocks due to biomass loss in forest land was estimated using the following formula:

$$\Delta CF_{LF,LOSS} = L_{fellings} + L_{fuelwood} + L_{other\ losses}$$

Where: $L_{fellings}$ is the annual carbon loss due to commercial fellings; $L_{fuelwood}$ is the annual carbon loss due to fuelwood gathering; and $L_{other\ losses}$ are any other losses of carbon. In line with IPCC guidance, it was assumed that no forestry is likely to occur within the afforested area so $L_{fellings}$ is equal to zero and there are no other losses of forest other than for fuelwood so $L_{other\ losses}$ is also equal to zero. The loss of carbon due to the demand for fuelwood was estimated using the following formula:

$$L_{fuelwood} = \left(A_{INT\_MANk} + A_{EXT\_MANm}\right) * FG * D * CF$$

Where: *FG* is the annual volume of fuelwood gathering; and *D* is the basic wood density. In the IPCC guidance, the recommended approach also includes a below-ground biomass correction factor and a biomass expansion factor for converting volumes of extracted roundwood to total aboveground biomass. Volumes of annual fuelwood gathering were estimated for Mount Elgon using national averages provided by KFS and Ministry of Environment, Water and Natural Resources (now the Ministry of Environment and Forestry) (2013). These estimates could be updated in future with more localised data.

Combining all of the equations, the change in carbon stocks associated with afforestation in Mount

Elgon was estimated using the equation:

$$\Delta C_{LF} = \left(\left[\sum_{k} A_{INT\_MANk} * G_{Total\ INT\_MANk} + \sum_{m} A_{EXT\_MANm} * G_{Total\ EXT\_MANm} \right] * BG_{k,m} * CF \right) - \left(\left[A_{INT\_MANk} + A_{EXT\_MANm} \right] * FG * D * CF \right)$$

A summary of the parameters used for each of these values is presented in Table 12.

Table 12: Parameters used for estimating carbon sequestration at Mount Elgon

Parameter	Value	Explanation
A_{INT_MANk}	0.5 ha	The Kenya A/F CDM design documents for KFS PELIS A/R CDM projects estimated that 100% of the project area would be intensively managed as plantation forest, while Aberdare Range / Mt. Kenya Small Scale Reforestation Initiatives involve natural regeneration (however, this would also involve some active management). At this stage of the assessment, and average between these two projects types was taken, and it is assumed that 50% of the afforestation would be intensively managed although this estimate could be revised in Stage 2.
$G_{Total\ INT\_MANk}$	11 tonnes of dry matter per ha per year	This is the annual growth rate for 'other' montane plantation forest from the IPCC guidance, Table 3A.1.6.[20]
A_{EXT_MANm}	0.5 ha	As for the intensively managed parameter documents, it is assumed that 50% of the area would be extensively managed, based on an average from KFS PELIS and Aberdare Range / Mt. Kenya Small Scale Reforestation Initiatives projects. This could be revised in Stage 2.
$G_{Total\ EXT\_MANm}$	5 tonnes of dry matter per ha year	This is the annual growth rate for natural montane moist forest regeneration from the IPCC guidance, Table 3A.1.5.
BG_k	1.46 if the cumulative biomass growth is less than 50 tonnes per ha, 1.32 if between 50 and 150, and 1.23 if more than 150	To account for below-ground biomass (including roots) in plantation forest, as set out in Table 3A.1.8 (note, this factor is the same for all plantation forests).
BG_m	1.24	To account for below-ground biomass (including roots) in tropical moist forest as set out in Table 3A.1.8 (note, there are no estimates available for montane moist forest and tropical/sub-tropical moist forest is assumed to be the closest equivalent).
CF	0.5 tonnes of carbon per tonne of dry matter	This is the default value for estimating the carbon content of biomass from the IPCC guidance and also used within Kenya A/R CDM project design documents.
D	0.46 tonnes of dry matter per m^3	This is the mean basic wood density for all boreal and temperate species given in the IPCC guidance, Table 3A.1.9.
FG	2.97 m^3 per ha per year	This is the estimated annual per hectare volume of fuelwood gathering identified.[21] This figure is based on various assumptions and should be refined in Stage 2.

[20] For all IPCC references in this table see: https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp3/Anx_3A_1_Data_Tables.pdf

[21] Calculated based on national averages provided by FS and Ministry of Environment, Water and Natural Resources (2013).

Using this model and assuming that the project runs for a 20-year period (in line with both KFS PELIS and Aberdare Range / Mt. Kenya Small Scale Reforestation Initiatives), the total potential carbon sequestration value for the scheme is estimated to be 4.48 tonnes of carbon per ha per year. This is equivalent to 16.44 tonnes of CO_2e per ha per year and compares to an average of 25.34 tonnes CO_2e per ha per year as reported within the project design documents for the KFS PELIS and Aberdare Range / Mt. Kenya Small Scale Reforestation Initiative A/R CDM projects. It should be noted that a recent study by Cuni-Sanchez et al. (2021) estimates carbon sequestration rates for montane forests in Africa to be two thirds higher than the IPCC default values used in this analysis. The implications of this alternative sequestration rate is discussed further in the following sub-sections.

Demand

The potential revenues from carbon sequestration were estimated using the approach set out in Watson et al. (2013) which looked at the potential returns from carbon sequestration in the Bale Mountains, Ethiopia.

According to this approach, the potential revenues were estimated over a 20-year period using the formula:

$$NPV = \left(\sum_{t=1}^{20} \frac{[E_t(1-B)(p-r)-A]}{(1+\delta)^{t-1}} \right) - K$$

Where: *NPV* is the Net Present Value of the carbon stored; *Et* is the amount of carbon stored by the project in Year *t*; *B* is a non-tradable risk buffer of emission reductions expressed as a proportion of the total carbon stock; *p* is the price per tonne of CO_2 (all values are provided in 2020 KES and USD); *r* is the registry cost per tonne of CO_2; *A* is the annual operating cost of the project; δ is the discount rate; and *K* is the up-front cost of the project.

In line with the CDM project design documents, it is assumed that there is no physical buffer area although this could be revised in Stage 2. There is a significant degree of uncertainty in the carbon price and the potential revenue secured per tonne of CO_2. For the purposes of this assessment average prices from a REDD+ project in Chyulu Hills, Kenya were used.[22] The scheme is run by the Maasai Wilderness Conservation Trust and provides a useful basis for comparison. Results indicate the carbon price could range from KES 648 (USD $6) to KES 1,296 (USD $12), with high uncertainty over time.

The transaction costs of listing emission reductions, annual monitoring, verification, and operational costs were estimated at KES 10,456 per ha (USD 96.84); and project establishment costs were estimated at KES 5,103 (USD 47.27) per ha based on the figures provided in World Bank (2020) and Nantongo and Vatn (2019). Note this does not include opportunity costs which are explored in the feasibility sub-section.

The discount rate was assumed to be 7% based on the social discount rate for projects in Kenya as in Warusawitharana (2014) and used in Langat et al. (2019). A summary of all of the parameters used is set out in Table 13.

[22] Based on personal communications with team members of the REDD+ project. For more information on this scheme, see: http://maasaiwilderness.org/programs/carbonproject/ .

Table 13: Parameters used for estimating carbon revenues at Mount Elgon

Parameter	Value	Explanation
E	4.48 tonnes of CO_2 per ha per year	See preceding 'Supply' section.
B	0%	Buffer reserve assumed to be zero. This assumption should be revised in Stage 2.
P	KES 648 – 1,296 per $tCCO_2e$ USD \$6 - \$12 per $tCCO_2e$	Based on estimates of carbon price achieved by the Chyulu Hills REDD+ scheme.
R	\$ --	A registration cost per tonne of CO_2 is included within the estimated costs per ha for parameters A and K.
A	KES 10,456 per ha USD 96.84 per ha	Estimated based on total cost to BioCF per ha in World Bank (2020). Note this estimate is inclusive of a registration cost per tonne of CO_2 (see above).
Δ	7%	Based on the social discount rate for projects in Kenya as in Warusawitharana (2014) and used in Langat et al. (2019). This could be revised and sensitivity testing could be undertaken in Stage 2.
K	KES 5,103 per ha USD 42.47 per ha	Based on estimates of project establishment costs as a proportion of total costs set out in Nantongo and Vatn (2019) and applied to total costs per ha for BioCF projects as set out in World Bank (2020).

Using this model and assuming that the project runs for a 20-year period (in line with project design documents for A/R CDM projects in Kenya), the total Net Present Value of the carbon generated through the scheme is estimated to be between KES -50,639 to KES 64,206 (USD -469 to 595) per ha over the 20-year period. As indicted by these results, with a price of \$6 per tCO_2e, the estimated revenues would not cover the costs of running the scheme (this is without taking into account further opportunity costs explored in the next sub-section).

Feasibility

This high-level analysis of the supply and demand for carbon sequestration services in Mount Elgon suggests that there are net benefits from afforestation over a 20-year period. However, in order to assess whether these benefits are significant enough to provide sufficient incentive for local smallholders to engage in a scheme, they need to be compared against the potential income that could be derived from alternative uses of the land (World Bank, 2020; Sumukwo et al., 2011). These 'opportunity costs' are notoriously difficult to measure (Lederer, 2011). Ideally any costs incurred for agricultural activities would be subtracted from agricultural revenues, however this study found limited information on incomes and production costs.

For the purposes of comparison, results from a survey conducted by Sumukwo et al. (2011) found that average monthly income from farming activities was around KES 4,949 from an average land holding of 1.5 hectares, or KES 2,749 per hectare per month. This gives a high-level indication of opportunity costs of around KES 33,000 per hectare per year. This suggests that the present value of the opportunity

cost per hectare may be higher than the potential income after accounting for the costs of the scheme. It also suggests opportunity costs of around $14 per tonne, which is within the range estimated based on 57 REDD+ schemes as detailed by Liu et al. (2020).

Based on this analysis, a potential CDM or voluntary market scheme focused on afforestation at Mount Elgon would need to achieve around $30 per tCO_2e (KES 3,200) in order to equal costs, and a higher price would be needed for estimated benefits to outweigh costs.

The High-Level Commission on Carbon Prices estimated that carbon prices of at least US $40–80/$tCO_2$ by 2020 and US $50–100/$tCO_2$ by 2030 are required to cost-effectively reduce emissions in line with the temperature goals of the Paris Agreement (World Bank, 2020). According to other estimates, the price could increase from today's prices by 10 to 20 times (McKinsey, 2021; S&P Global, 2021; UCL & Trove Research, 2021). In the UK, a Trees for Life carbon project has increased their sale price for credits (due to unprecedented demand) to £38 per credit (around $50 and KES 5,700) (Trees for Life, 2021). Therefore, the feasibility of achieving a price of $30 or above may be possible in the near future. This analysis could be revisited in line with price changes overtime.

It should be noted that if carbon sequestration rates for Mount Elgon align with those reported in a recent study by Cuni-Sanchez et al. (2021) (which estimated sequestration rates for montane forests in Africa to be two thirds higher than the IPCC default values used in this analysis) the benefits would outweigh the costs of a potential PES scheme, even at the current price of between $6 - $12 used within this analysis. The margin at which costs are outweighing estimated carbon income could also potentially be addressed through a bundled PES scheme, whereby payments are received for more than one service. It should also be noted that various assumptions have been made throughout this analysis which could be revisited to explore the impact on expected costs and revenues in future.

An overview of the initial feasibility assessment is set out in Table 14 The findings of this assessment can be ground-truthed and revised as necessary in Stage 2.

Table 14: Overview of global climate regulation (carbon sequestration) PES feasibility

Potential NPV of CO_2 (KES/ha & USD/ha)	PV of opportunity cost (KES/ha & USD/ha)	Does the NPV exceed the opportunity cost?
KES -50,639 – 64,206 USD -$469 – $595	KES 349,531 USD $3,238	✗ if a price of under $30 per tCO_2e is achieved ✓ if price of $30/$tCO_2e$ or higher is achieved

Engel and Muller (2016) identified climate-smart agriculture (e.g. agroforestry) as the most promising practice to be promoted by PES among smallholders with limited income. The feasibility of tree-planting on cropland and agroforestry to support a potential bundled PES has been assessed in further detail in Appendix A. However, their study also showed that the use of carbon finance to incentivise this type of bio-carbon storage is still very low, due to the absence of institutional frameworks, reliable sources of carbon finance and involvement of public and private sector actors. The number of smallholders needed to achieve an area of land large enough to compensate for project transaction costs also makes carbon finance projects practically unattainable at the current market price for carbon. Low carbon prices mean that the incentive for farmers is not the carbon payment, but the benefits arising from emission-reducing farm management.

Further research is needed in Stage 2 to determine where specifically in the Mount Elgon landscape afforestation (agroforestry) interventions would be most appropriate, which and how many landowners/land managers would be engaged, and then to establish the feasibility of developing and operating a carbon offset project using more detailed, site-specific information.

Elephant carbon

The valuable ecological benefits that keystone species—such as elephants—support can be reflected using innovative mechanisms that provide finance for their conservation. One such example is Rebalance Earth[23] carbon offsetting, which has estimated the carbon impact of forest elephants and whales. According to their research, the presence of forest elephants increases carbon sequestration in forests significantly through the thinning of trees which enables trees to grow larger and taller, as well as through distributing nutrient-rich dung (see Error! Reference source not found.).

The ecosystem benefits provided by elephants have been estimated at $1.75 million per elephant (Chami et al., 2020; International Monetary Fund (IMF), 2020). In recognition of the significant value elephant populations provide, Rebalance Earth is partnering with companies that have committed to a net zero carbon footprint and who value the protection of keystone species. Through financial payments companies secure credits linked to ecosystem services supported by the protection of keystone species. Although this is a relatively new mechanism, with little information yet available about the practicalities and costs and benefits of such a scheme, the suitability of such an approach could be explored in more detail in Stage 2. In particular, exploring the potential for linking activities and finance around carbon and biodiversity, two priority ecosystem services identified within this study, for Mount Elgon could be further explored.

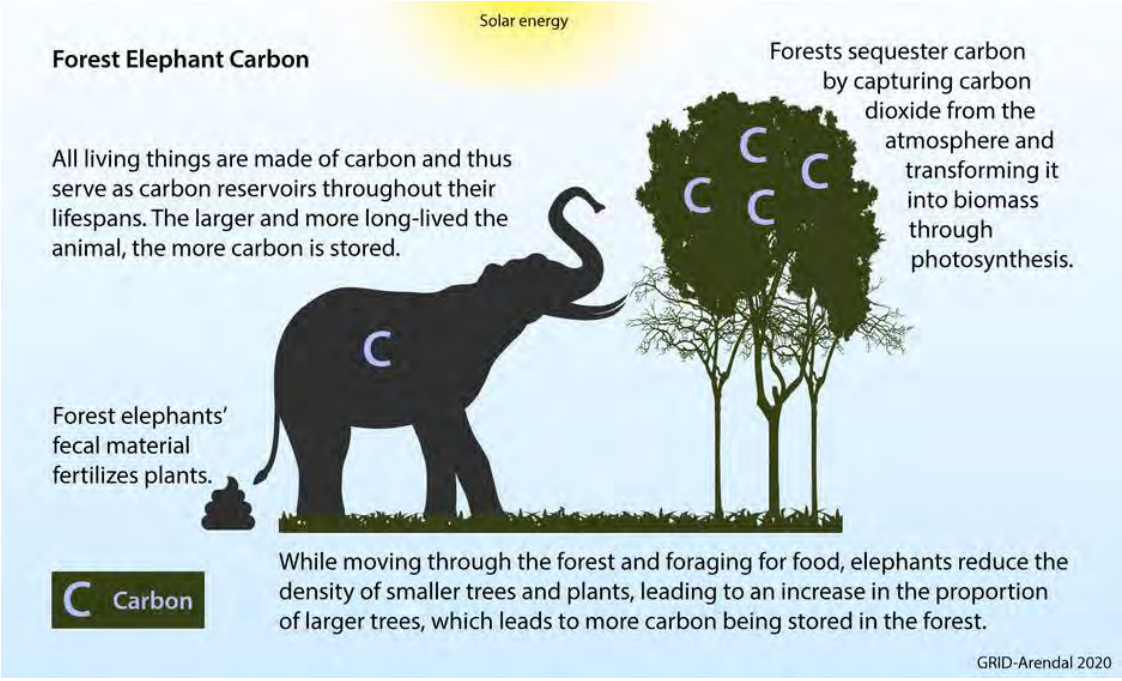


Figure 12: **Overview of an elephant's contribution to the carbon cycle**

Source: IMF (2020). The Secret Works of Elephants.

3.3.4. WILD SPECIES DIVERSITY / BIODIVERSITY

Wild species diversity or biodiversity refers to the variety of life on earth and the natural patterns it forms. Biodiversity and ecosystem services contribute directly to human well-being and development priorities. Many of the most vulnerable people depend directly on biodiversity to fulfil their daily subsistence needs (CBD, n.d). Ecosystems weakened by loss of biodiversity are less likely to provide these goods and services. Globally, local varieties of plants and animals are disappearing. The major pressures on biodiversity include (CBD, 2012):

[23] For more information see: https://www.rebalance.earth/

- Loss, degradation and fragmentation of natural habitats.
- Overexploitation of biological resources.
- Pollution, including the build-up of nutrients such as nitrogen and phosphorous in wetlands.
- The impact of invasive alien species on ecosystems.
- Climate change and acidification of oceans associated with the build-up of greenhouse gases in the atmosphere.
- Lack of awareness of biodiversity and its values.

Biodiversity loss, including genetic diversity, poses a serious risk to global food security by undermining the resilience of many agricultural systems to threats such as pests and pathogens. Tourism and fisheries as a source of livelihood to many communities are also adversely impacted by biodiversity loss.

Kenya is a signatory to the Convention on Biological Diversity (CBD) which is an internationally binding treaty covering biodiversity at all levels: ecosystems, species and genetic resources. The treaty has three main objectives: the conservation of biological diversity, the sustainable use of the components of biological diversity and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources. The country has a wide array of ecological zones and habitats including lowland and mountain forests, wooded and open grasslands, semi-arid scrublands, dry woodlands, inland aquatic and coastal and marine ecosystems (CBD, 2020).

Kenya is endowed with an enormous diversity of ecosystems and wildlife species which live in the terrestrial, aquatic and aerial environments. The different ecosystems in the country are crucial for national prosperity as a source of food, medicines, energy, shelter, employment and foreign exchange. Agriculture is the backbone of Kenya's economy, and is dependent on the availability and functionality of ecological systems, especially those that influence pollination, soil fertility and water availability (NEMA, 2017).

Kenya is home to five hot spots of globally important biodiversity and 61 important bird areas (IBAs). The Afro-montane forests of Mount Elgon along with Mount Kenya, and the Aberdares are recognised as among Kenya's unique and biodiversity-rich regions alongside the Indian Ocean Islands of Lamu and Kisite; the coastal forests of Arabuko-Sokoke and the lower Tana River; Kakamega's Guineo-Congolian equatorial forest; and the Northern drylands that form part of the distinct Horn of Africa biodiversity region. These ecosystems collectively contain high levels of species diversity and genetic pool variability with some species being endemic or rare, critically endangered, threatened or vulnerable (NEMA, 2017).

Supply

Mount Elgon was designated as a United Nations Educational Science and Cultural Organisation (UNESCO) Biosphere Reserve in 2003. This ecosystem represents one of the thirty-five (35) biodiversity hotspots in the world and forms part of the eastern or central Afromontane biodiversity hotspots that encompass several widely scattered mountain ranges in eastern Africa. There are a variety of plants and animal species with different conservation status as presented in Table 15 below.

Flora

The vegetation of Mount Elgon is divided into distinct belts, which reflect altitudinally controlled climatic zones. These are: moist lower montane rainforest 1500-2450m and dry lower montane rainforest 2000-3050m, bamboo forest 2450-3050m, upper montane forest 3050-3300m, moorland 3300-3550m and the Afroalpine which is above 3550m (Ballatore and Olaka, 2015).

The moist lower montane forest is the most diverse in tree species and forms the habitat for Elgon Teak

(*Olea capensis*), a highly exploited commercial timber species. Above 3500m, swamps and moorland vegetation dominate including many rare species such as the giant lobelia plant (*Lobelia telekii*) and giant groundsel (*Dendrosenecio elgonensis*) along with common grasses abundant in the caldera. The natural rainforest vegetation of the lower slopes has been cleared and replaced with agricultural plantations (ACCESS, 2015).

Fauna

Rare and common animal species inhabit the mountain area. Most of the wildlife is found in the protected areas. This includes a small population of the 'cave elephants' that inhabit Mount Elgon on the Kenyan side, as well as the globally threatened *Macronyx sharpie* (Sharpe's Longclaw), *Cisticola hunteri* and *Francolinus jacksoni* (Jackson's francolin or Jackson's spurfowl). The biosphere reserve also hosts endemic wildlife such as the river frog, side-stripped chameleon, the marine viper, king mole rat and the mole shrew. Other wild animals in the biosphere include forest hogs, leopards, eland, buffalo, duiker, impala, and several monkey species (UNESCO, 2019). A list of IUCN Red List Species found in Mount Elgon is presented in Table 15.

Mount Elgon is considered one of the Important Bird and Biodiversity Areas (IBA) in Kenya. Approximately 240 species of bird are found in the Mount Elgon ecosystem. Among the most common are helmeted guinea fowl, black and white casqued hornbill and the grey crowned crane. Other birds include: grey heron, long-tailed cormorant, African darter, great white egret, and little egret, night heron, hamerkop, yellow-billed stork, hadeda ibis, glossy ibis, yellow-billed duck, sparrow, varieties of doves and others. Mount Elgon is recognised as an IBA given that it holds significant populations of globally threatened species, restricted-range species and biome-restricted species (Birdlife International, 2021). The most recent (2009) IBA monitoring assessment for Mount Elgon concluded that it was in unfavourable condition and under significant threat from encroachment, illegal timber extraction, and unsustainable exploitation of non-timber forest products.

Table 15: IUCN Red List Species identified in Mount Elgon Kenya (Fauna, alphabetical order)

Species	Common name	Conservation status
Aepyceros melampus	Impala	Least Concern
Anas undulata	Yellow-billed Duck	Least Concern
Anhinga rufa	African Darter	Least Concern
Ardea alba	Great White Egret	Least Concern
Ardea Cinerea	Grey Heron	Least Concern
Balearica regulorum	Grey Crowned Crane	Endangered
Bostrychia hagedash	Hadeda Ibis	Least Concern
Cephalophus ogilbyi	While Legged Duiker	Near Threatened
Cisticola hunteri	Hunter's Cisticola	Least Concern
Cnemaspis elgonensis	Mount Elgon Forest Gecko	Vulnerable
Egretta garzetta	Little Egret	Least Concern
Hylochoerus meinertzhageni	Forest Hog	Decreasing
Macronyyx sharpe	Sharpe's Longclaw	Endangered
Microcarbo africanus	Long-tailed Cormorant	Least Concern
Mycteria ibis	Yellow-billed Stork	Least Concern

Numida meleagris	Helmeted Guineafowl	Least Concern
Nycticorax nysticorax	Black-crowned Night Heron	Least Concern
Plegadis falcinellus	Glossy Ibis	Least Concern
Pternistis jacksoni	Jackson's Francolin	Least Concern
Syncerus caffer	African Buffalo	Near Threatened
Tachyoryctes spledens	East Africa Mole Rat	Least Concern
Trioceros bitaeniatus	Side-stripped chameleon	Least Concern
Source: IUCN Red List		

Demand

As discussed earlier, the people of Mount Elgon mostly depend on agricultural activities and forest products for their livelihoods. Biodiverse ecosystems support pollinators which play a key role in agricultural production. Natural pollination enhances the quantity and quality of crops, increasing their value to farmers. In Mount Elgon, small mammals such as bats and birds are key pollinators alongside insects, which are by far the largest group, and bees which are the most important group of pollinating insects (Bayer, 2017). Furthermore, the floristic biodiversity is also important to many local households who rely on the medicinal properties of many of the plants.

The rich diversity of mammals, birds and vegetation also holds significant potential for eco-tourism. While tourism demand is presently relatively low compared to other areas in Kenya, it could potentially grow in future if the necessary infrastructure was developed and maintained. This is discussed further below.

Medicinal and pharmaceutical value

A study conducted by Langat et al. (2019), estimated the biodiversity value of Mount Elgon, in terms of the likely discovery of forest plants with economic, medicinal, and pharmaceutical extracts within the ecosystem. In the absence of either site-specific or country-wide data, the study authors used values from a study of the Korup National Park in Cameroon, adjusted for differences in purchasing power parity between the two countries. The Cameroon study indicated that the potential pharmaceutical value was in the order of USD 0.1 per hectare (1989 prices) for the tropical rain forest.

Results from the Langat et al study are presented in Table 16. The study found the biodiversity value of the indigenous forest of Mount Elgon to be KES 36 million, or around KES 729 per ha (USD $7). The estimate is, however, conservative, given that it focuses on one ecosystem service and does not incorporate the fundamental role that biodiversity plays in supporting the capacity of landscapes to provide a wider range of goods and ecosystem services.

Table 16. Biodiversity economic values of Mount Elgon Ecosystem

Ecosystem	Indigenous forest (ha)	Biodiversity value (KES)	Biodiversity value (USD)	KES/ha	USD/ha
Mount Elgon	49,275	35,925,508	245,571	729	7

Source: Reproduced using data from Langat et al. (2019)

Eco-tourism

Although the ecosystem service assessment did not identify tourism as a potential basis for a PES scheme on Mount Elgon (due to low levels of tourism currently, and lack of existing tourism infrastructure), the flora and fauna within Mount Elgon National Park do attract local and international tourists who come for camping, hiking, game viewing and bird watching. There may therefore be potential for tourists and visitors to make discretionary donations to a biodiversity-based PES that could be targeted at conservation in general or towards the protection of threatened or endangered species such as the elephants that regularly visit the Kitum caves.

However, tourism numbers and tourism revenue are relatively modest in the region (USAID, 2021) and Langat et al. (2019) showed that most local communities do not realise direct benefits from tourism. Furthermore, the COVID-19 pandemic has had a substantial impact on tourist numbers due to restrictions on international travel. Furthermore, the recent USAID study (2021) projected a substantial decline in annual tourism value in Kenya in the years following the pandemic should the rate of wildlife loss and habitat degradation continue as they are at present. Studies indicate encroachment pressures from livestock, settlement, and cultivation, will remain key challenges to biodiversity in future, including for a number of protected areas for wildlife tourism (USAID, 2021). This raises questions about the suitability of a biodiversity PES scheme centred on visitor giving. A PES scheme may, however, provide an opportunity to help halt this degradation by providing a sustainable source of finance for conservation and restoration activities that could be supplemented with discretionary donations that could be put into a trust fund to be used specifically for the purposes of habitat and species protection and enhancement.

Given the uncertainties as to the rate at which tourism numbers will recover following the pandemic, and in the scale and pace of growth of visitor numbers in future, it is difficult to assess whether or not a PES based on 'visitor giving' is likely to be feasible and sustainable over the long term. It is recommended that the potential for a PES based on ecotourism is revisited in future once trends in travel and tourism numbers can be more firmly established. The remainder of this analysis focuses on cultural, spiritual and bequest services.

Cultural and spiritual services and bequest values

Cultural ecosystem services are the benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences. These experiential benefits are gained through activities ranging from adventure sports to birdwatching, religious or cultural ceremonies, or just passive observation. In addition, cultural services include the satisfaction obtained from the knowledge of the existence of biodiversity (existence value) and its possible enjoyment by future generations (bequest value). Some of the traditional rite of passage among the Sabaot and Ogiek community are practised in the forest (Kisiwa et. al, nd). Some African traditional societies also associate forests and mountains with spirituality and hence such places remain sacred (ICRAF, 2020).

Stated preference (contingent valuation method) surveys were used to determine the willingness to pay (WTP) of local communities for the maintenance of the forest for cultural and bequest values (Langat et al., 2019). The results from the surveys revealed that most respondents were willing to pay between KES 100 and KES 5,000 per household per year to secure the continued availability of the forest for cultural, spiritual, and bequest values. The majority (60.5%) of respondents were willing to pay KES 100 for cultural and spiritual use, while 43.5 % of respondents were willing to pay KES 100 for bequest value, or to sustain use for future generations. The overall mean willingness to sustain cultural and spiritual uses was KES 517.50 per household per year and to maintain bequest values KES 923.50 per household per year, compared to an average income of around KES 60,000 (USD $600). Langat et al. (2019) went on to note that the relatively low WTP might be because the local communities currently receive these benefits without paying for them.

The WTP to conserve the forest for future generations was greater than the WTP for cultural and spiritual values, which shows bequest values are more important than cultural and spiritual values to the communities (noting there may be a strong correlation between cultural and traditional values, and bequest values and these are not necessarily mutually exclusive issues). Langat et al. (2019) further concluded that these WTP figures are likely very conservative, potentially due to the fact that local communities receive these services without paying for them. The total monetary values for cultural and spiritual uses are KES 43 million (around USD$ 378,500 per year) for Mount Elgon.

Biodiversity bequest and existence values accrue beyond the local communities. Global communities may hold high existence and bequest values for a national park such as Mount Elgon, which contains species garnering global interest and attention – such as the salt-mining cave elephants. As a designated UNESCO Biosphere Reserve and one of thirty-five biodiversity hotspots globally, it is reasonable to assume global interest in the area's conservation and protection. This is even more likely as society faces a biodiversity crisis with unprecedented declines in biodiversity and accelerating rates of species extinction (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), 2019).

This study has therefore used the average per hectare existence and bequest values for related forest types from over 450 studies as provided within the Ecosystem Service Valuation Database (ESVD) (De Groot et al., 2020). These values were used to provide a high-level estimate of the potential benefits of conserving biodiversity. These should, however, be refined in further stages of PES design. These values are indicative of the amounts that individuals across the global community may be willing to give as donations (typically in response to an appeal or campaign) to conservation organisations that are active in Mount Elgon.

In summary, a biodiversity or conservation-based PES could take different forms, with common approaches including visitor giving schemes, whereby tourists and visitors make payments directly, or through conservation donations received by conservation charities (including from people who may never visit but value the biodiversity nonetheless). At present, given uncertainties in the recovery and growth of visitor numbers to Mount Elgon, it is not possible to evaluate the long-term viability of a PES scheme that is reliant on visitor giving. The feasibility assessment below thus focuses on the potential for eliciting sustainable finance for conservation from interested individuals or organisations who may never visit the area but who are nevertheless interested in contributing towards its protection.

Feasibility

Table 17 presents the parameters used to provide a high-level estimate of the feasibility of a potential PES centred on biodiversity.

Table 17: Parameters used to assess biodiversity PES feasibility at Mount Elgon

Parameter	Value	Explanation
Discount rate	7%	Based on the social discount rate for projects in Kenya as in Warusawitharana (2014) and used in Langat et al. (2019). This should be revised and sensitivity testing should be undertaken in Stage 2.
Costs per ha/yr	Low KES 75,320 (USD 698)	Taken from Busch et al. (2012) and converted to KES and USD 2020. Represents the estimated range of costs per year (including implementation costs) associated with maintaining or establishing native forest cover.
	Central KES 69,146 (USD $1,574)	

Parameter	Value	Explanation
	High KES 264,577 (USD $2,451)	
Conservation benefits per ha/yr	Low KES 5,908 (USD $55)	Estimated using existence and bequest values per hectare per year for relevant forest cover from the Ecosystem Service Valuation Database (ESVD) (De Groot et al., 2020).
	Central KES 69,146 (USD $640)	
	High KES 132,384 (USD $1,226)	
Assessment period	20 years	To be consistent with the timelines used elsewhere in this report for assessing carbon benefits

Table 18 presents the sum of discounted costs and benefits over the assessment period. The feasibility assessment suggests that under the 'High' scenario (with low costs and high benefits) the benefits of a conservation / biodiversity based-PES may outweigh the costs. However, the NPV is negative for both the 'Central' and 'Low' scenarios, indicating that the results are likely sensitive to assumptions made within this analysis. These results therefore indicate the need for more robust estimates of costs and benefits specific to Mount Elgon. Further work would also be required to establish the appropriate mechanism through which donations could be channelled (e.g. through a specific organisation), how best to raise awareness of the pressures and threats that the biodiversity of Mount Elgon is facing and how donations would contribute to biodiversity conservation; what the specific conservation actions are that are required, and how to allocate these revenues towards those who will be responsible for implementing those actions.

Table 18: Overview of biodiversity / conservation PES feasibility

Scenario	NPV (20 years)	Does the NPV exceed the opportunity cost?
Low	KES -2,740,340 (USD -$25,383)	✗
Central	KES -1,067,904 (USD $-9892)	✗
High	KES 604,533 (USD $5,600)	✓

In general, the results may also highlight the wider opportunities for bundling or linking conservation-based PES activities to those focusing on forest carbon and the production of certified sustainable timber (see Section 4 for more detail). The actions necessary to protect and restore biodiversity and their associated costs overlap with those necessary to avoid or remove GHG emissions and to produce sustainably-grown timber. This suggests that the most sustainable form of PES scheme may be a bundled or layered scheme. In the bundled scheme, buyers would pay for an 'anchor' service (e.g. carbon or biodiversity) which is priced at a premium to account for the wider co-benefits being delivered. A layered scheme would be targeted at different groups of buyers, each interested in securing a particular service. There may also be further opportunities to link conservation of a particular keystone species – for example new credit mechanisms linking carbon and elephant conservation (see 'Elephant Carbon' sub-section). Layered schemes are, however, administratively more complex and would need to demonstrate additionality.

4. Key parameters

The key parameters identified within this analysis were presented at two workshops: the first in Nairobi on 7th December 2021 and the second in Kitale on 9th December 2021. Both workshops had government, local community members, and local charity and NGO members in attendance. Stakeholder viewpoints were used to:

- Further develop / refine key parameters identified and gauge interest and reaction to potential PES activities;
- Identify key risks and challenges associated with key parameters of a potential scheme; and
- Identify actions which are necessary to progress through Stage 2 of the PES framework.

The findings from the workshop were also used to develop a PES Action Plan for Mount Elgon, which aims to identify key data gaps, actions, actors and activities which stakeholders can undertake to progress a potential PES into the next stages of development (see Section 7).

An outline of the key parameters of a potential PES scheme on Mount Elgon is set out in Table 19. At this stage, these are indicative of the potential design of a prospective PES scheme and provide the starting point and focus for more detailed research in Stage 2 of the PES framework. It is expected that they would be further refined and then confirmed at the end of Stage 2.

Table 19: Potential key parameters for a PES scheme on Mount Elgon

Item	Potential parameter
Objectives	Investigate the potential for setting up a bundled PES focused on carbon sequestration and storage. The design of the scheme would be such that the interventions that are implemented to enhance carbon sequestration would also enhance the delivery of a wider range of ecosystem services including biodiversity conservation, water quality regulation, pollination, and soil quality while also improving livelihoods. Because of the additional benefits provided, the carbon credits could be sold at a premium and the revenues used to support additional conservation and livelihood improvement activities. The interventions might include afforestation (through agroforestry), forest conservation (through reduced encroachment into forested areas) and more sustainable agricultural land management practices.
Ecosystem services	Primary service: Global climate regulation through the sequestration and storage of carbon by forests, trees and soils. Note that depending on the standard used to verify the project, there may be a need to monitor and verify (but not necessarily quantify) impacts on other ecosystem services including habitat for biodiversity.
Environmental co-benefits	Habitat for biodiversity, water quality regulation, improvements in soil quality, hazard (e.g. flooding and erosion) control, pollination, air quality, provision of more sustainable sources of wood, fuelwood, wild foods, and potentially higher crop yields, and opportunities for eco-tourism. The net impact of PES activities on water supply and food security should be closely monitored.
Social co-benefits	Potential social co-benefits include income generation/poverty alleviation by providing communities with employment and income-generating opportunities, as well as the associated benefits to health and wellbeing that higher and more sustainable household income affords. Habitat restoration, protection and enhancement activities could also provide benefits to cultural and spiritual practices and provide opportunities for scientific learning.

Item	Potential parameter
Potential buyers	Potential buyers could be international organisations (or individuals) looking to purchase premium offsets on the voluntary carbon markets, where the premium is linked to positive biodiversity and social impacts. There may also be interest from local business owners, particularly agri-business and large energy users who may be interested in offsetting their emissions by investing in a local carbon offset project. There may also be potential to layer on a visitor-giving element whereby visitors (e.g., to the National Park) make discretionary payments into a fund which is used specifically to finance activities targeted at biodiversity conservation.
Sellers	Sellers would include local communities, conservation groups, organisations with landownership in the area (e.g. a portion of payments could support KWS and KFS), small-scale farmers, and others who live and work on the land and who have rights to the ecosystem services to be sold. The potential involvement of existing community associations such as CFAs, WRUAs and CWAs in the project area should be clarified as should potential synergies and overlaps with existing initiatives such as the Kenya Carbon Project and FAO's Integrated Landscape Management project. Ideally, where these community entities exist in the PES scheme area, they would be involved in the proposed voluntary PES, as the entities may facilitate engagement and collaboration and could also potentially provide a mechanism for aggregating sellers (e.g. by acting as community representatives) thereby reducing the transaction costs associated with engaging separately with multiple individuals or groups.
Intermediaries	There are a large number of organisations and community members involved in the management, protection, and ownership of land on Mount Elgon. Consideration therefore needs to be given to whether one of these entities could act as a 'Project Office' in terms of coordinating project activities, acting as an 'honest broker' between buyers and sellers, and providing financial management and administrative support, or whether a new entity (e.g. a conservation trust) should be established to take on this role. The choice of an appropriate intermediary body should be confirmed in Stage 2.
Knowledge providers	Knowledge providers could include any organisation able to provide technical advice, data or other information essential to the development and implementation of the scheme. These could include resource management experts, valuation specialists, land use planners, county government, carbon offset project developers and business and legal advisors. Some of the organisations that could potentially be involved in the development of a carbon-based PES in Mount Elgon include KEFRI, NMK, KWS, KFS, KWTA, FAO, MEEP, universities and those involved in other PES and carbon offset projects in Kenya who may be able to share valuable lessons and guidance.
Geographical scale	The PES study area for Mount Elgon can readily align with the existing Mount Elgon Water Tower boundary. Further work is needed in Stage 2 to identify specific geographic areas for: i) forest protection, management and enhancement, ii) implementation of agroforestry and other sustainable agricultural land management practices (including afforestation), iii) sustainable extraction of forest resources including areas for local communities to access the forest for the purposes of harvesting wood products and iv) core biodiversity protection areas (which may align with forest carbon protection areas). These provisions would typically be included in an environmental management plan (required by most standards) and monitored according to a monitoring plan. The geographical scale will also, at least in part, be driven by the location of communities who wish to be engaged in the scheme.
Interventions	The primary interventions funded through PES revenues are anticipated to include tree-planting (which may need to be supported by the establishment of new/or expanded seedling nurseries), the adoption of improved agricultural land management practices (e.g., residue management, cover cropping, integrated pest management, composting, halting forest encroachment etc.) as well as any necessary training activities, monitoring and enforcement services. These activities would need to be underpinned by comprehensive land management and monitoring plans which would need to be developed as part of the final project design and which would also be necessary to support validation of a carbon offset project against any of the relevant carbon standards (e.g., VCS or CDM)

Item	Potential parameter
Quantification of services	In the absence of detailed site-specific information, quantification of carbon sequestration in Stage 1 has been performed using the Tier 1 approach set out in the IPCC guidance which is broadly in line with an UNFCCC Approved Methodology for afforestation/reforestation on degraded lands. A more detailed assessment using project-level data and based on an approved methodology for either afforestation/reforestation or sustainable agricultural land management would be required if seeking validation of the scheme against a recognised standard. In order to generate premium credits, the carbon offset project could be validated to an enhanced standard by, for example, combining the VCS with Climate, Community and Biodiversity (CCB) Standards[24]. If pursuing CCB accreditation (for premium offsets), monitoring and verification of biodiversity and other environmental and social impacts would be required. Regular species surveys and monitoring could help with quantification of biodiversity impacts against a project baseline. Sustainable forestry activities could be volumes of wood and non-wood forest products harvested/produced in line with a Sustainable Forest Management Plan, with a focus on endemic/native tree species. Social co-benefits could be quantified through records of jobs, skills, income generation, and health and wellbeing of the local population, measured against an established baseline. The CCB Standards criteria ensure that projects: • Identify all stakeholders and ensure their full and effective participation; • Recognize and respect customary and statutory rights; • Obtain free, prior and informed consent; • Assess and monitor direct and indirect costs, benefits and risks; • Identify and maintain high conservation values; and • Demonstrate net positive climate, community and biodiversity benefits
Type of payment	Payment vehicle structure should be informed by law and preference of PES participants. For instance, some payees may not want payments to go directly to individuals, but rather to a third-party entity that can manage and distribute the funds. There should be emphasis on transparent and equitable benefit sharing (e.g. there could be a mechanism for PES scheme participants to vote on the allocation of funds or participants could submit 'proposals' to access funds for specific activities). In some instances, cash payments might be accompanied by in-kind payments such as the provision of capacity building, advice on best practice or help with accessing grants. It should also be noted that while PES is generally conceived of as a series of payments in exchange for the provision of ecosystem services, in practice PES schemes may also involve one-off payments, for example to cover the upfront costs of ecosystem restoration.

[24] https://www.climate-standards.org/ccb-standards/

Item	Potential parameter
Contractual format	The most appropriate form of contract will need to be identified in Stage 2 as this will be determined, in least in part, by the architecture of the PES scheme and, more specifically, the intermediary organisation that will be responsible for administering the scheme, the number of 'sellers' (i.e. those responsible for implementing the agreed interventions) and the nature of the buyer(s). Form and length of contract to be explored in consultation with ecosystem sellers and with potential buyers. Contracts with ecosystem service providers may need to be aligned with the carbon standard to which the carbon offset project is likely to be verified. Access rights for indigenous / local communities to access and harvest should be featured in the contract. In the case of a public forest, KFS involvement and consent will be necessary to be able to monetise potential PES activities (e.g. through a concession or joint management agreement). The PES scheme would need the approval and participation of KFS, KWS and County Government, where the national reserve is under the management of the County Government and not KFS. This is based on the oversight mandate bestowed on these entities with respect to public land. Further work should investigate the potential to integrate visitor giving with the carbon credit scheme (e.g. potentially through m-pesa/ PayPal / QR code payment).
Approach to monitoring	Monitoring of any carbon benefits will be determined by the carbon standard that is used to verify the carbon credits from the scheme. If opting for CCB certification, a means of monitoring non-carbon benefits will also be required. Local community and indigenous groups, other relevant groups (e.g. CFAs), and regional government officers could support monitoring activities but may require training to do so. All credits should be independently validated and verified to ensure that planned activities result in the impacts claimed over the duration of the project, providing assurance to all actors involved. The net impact of PES activities on food security and water resources should be carefully monitored. The net impact of PES activities on the following should also be closely monitored: ▪ Water supply (afforestation could have the potential to decrease surface water through evapotranspiration and/or increase groundwater through greater infiltration). ▪ Food security (as potential for cropland to be lost through agroforestry or afforestation).

5. Legal analysis

An adequate legal framework is needed to enable parties to enter into PES contracts and promote the sustainability of PES schemes. This legal analysis highlights the overarching laws determining land and other natural resource ownership within the project area and the specific laws relevant to each of the relevant ecosystem services. At this scoping stage, these ecosystem services are still under evaluation and further consideration of their viability for inclusion in any PES scheme would need to be demonstrated before a scheme is finalised.

For a PES scheme to be successful, it must be clear that the seller has all of the rights to the ecosystem benefits, and that they are entitled to transfer these rights to the buyer. This is necessary for the seller to be able to enter into a contract to sell the ecosystem service to the buyer. Clear rights to the ecosystem service are necessary to protect against other potential owners claiming payment for the service, or other owners seeking to sell the same ecosystem benefits to another buyer, potentially creating a 'double claiming' issue.

This analysis focused on the ownership of the proposed ecosystem benefits and the transferability of such benefits to the buyers. In general, the ownership of the ecosystem benefits under consideration is not clear under Kenyan law. Depending on the type of ecosystem benefit, relevant factors include land ownership and the jurisdiction over the resource related to the ecosystem benefit. This legal analysis also highlights the laws in Kenya supporting PES generally, the land ownership of the prospective PES scheme area, and the specific laws relevant to each of the relevant ecosystem services. We note that PES in general is considered as an area for further development by the Government of Kenya (Government)—namely as part of the national PES working group setting national PES policy. This is an area of law that may evolve in the future and should be closely monitored as it may affect any PES scheme in Mount Elgon.

The following subsections summarise the findings from the legal analysis. Further detail from the legal analysis is provided in Appendix B.

5.1 The structure of a proposed Mount Elgon PES scheme

This legal analysis is based on the understanding that the prospective PES scheme area essentially aligns with the Mount Elgon Water Tower boundary (see Section 2).

This analysis assumed that, under any PES scheme, the sellers (ecosystem service providers), would be carrying out conservation activities in the PES scheme area, and they would engage potential buyers (ecosystem service users), likely through an intermediary. The intermediary would present a case for the PES scheme and request payments (voluntary) from the buyers for their use of specific ecosystem services derived from the PES scheme area.

Willing buyers would make payments for their use of ecosystem services, with the payments made to the intermediary, for further distribution to the sellers (ecosystem service providers), to be used for further protection of the Mount Elgon ecosystem. Figure 13 briefly illustrates a summary of the prospective PES scheme structure:

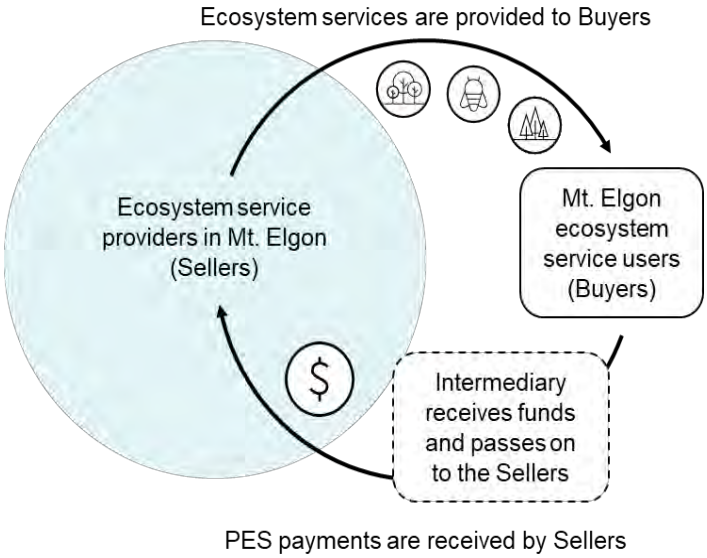


Figure 13: Potential PES scheme structure

Source: Pollination

5.2 The policy, legal, and regulatory framework supporting PES in Kenya

Kenya does not have one overarching law or policy on compliance-based or voluntary PES schemes. The existing policy, legal and regulatory framework laws, however, support the principle behind establishing a PES scheme but do not specifically elaborate on the modalities for effecting a PES scheme whether regulatory or voluntary. The applicable law in any given circumstance will depend on the nature of the PES scheme.

Table 20 summarises the Kenyan laws and policies that reference PES. These point to the Government's interest in PES, challenges facing PES, and the Government's intention to prioritise PES as an innovative financing mechanism for the natural resources sector. However, these particular laws and policies largely mention PES in the context of plans for what the Government intends to do, without going further to set out modalities for operationalising PES. As such, actualising PES under the current legal framework would rely on laws and policies that do not necessarily mention PES directly but have provisions that are key in supporting its implementation. These have been presented in more detail in Appendix B.

We also note that the Government has established a national level working group on PES that is intended to set national-level PES policy. This group has not published any recommendations as yet but its actions should be monitored to the extent it impacts a voluntary PES scheme. In addition, the Government is currently engaged in implementing its climate-related commitments under the Paris Agreement, including its approach to carbon markets and REDD+ and the establishment of a jurisdictional REDD+ program. This implies that the Government will be regulating carbon benefits from REDD+ through climate regulations rather than including carbon as part of PES.

It is our view that the development of climate regulation more broadly and specific actions on REDD+ (jurisdictional and nesting policies) demonstrates that the Government is likely to primarily regulate carbon through these means rather than through a PES policy. As such, the Government has a national PES group that is providing recommendations on national level policy and is developing its approach on jurisdictional REDD+ that would affect REDD+ projects and the sale of carbon credits. Both of these activities may affect a voluntary PES scheme and should be closely monitored to evaluate the extent to which they may affect the analysis.

Table 20: Laws and policies relevant to PES in Kenya

Law / policy	Existing/In draft	PES relevance
Kenya Water Towers Agency Order, 2012	Existing	Establishes the Kenya Water Towers Agency and under Section 5 (1) (d), functions of the Agency are set out to include mobilising resources from the Government, development partners, and other stakeholders as well as through payment for environmental services, including carbon reservoirs and sequestration.
The Environment Policy, 2013	Existing	Sets out one of its objectives as being *"to promote and support research and capacity development as well as use of innovative environmental management tools such as incentives, disincentives, total economic valuation, indicators of sustainable development, Strategic Environmental Assessments (SEAs), Environmental Impact Assessments (EIAs), Environmental Audits (EA) and Payment for Environmental Services (PES)."*
Forest Policy, 2014	Existing	Recognises that sustainable forest management and conservation requires adequate financial resources and sets out a policy proposal that the Government will enhance resource mobilisation strategies through carbon financing, payment for environmental services, and other appropriate mechanisms.
Forest Conservation and Management Act, 2016	Existing	Makes provision for the sustainable management of forest resources. Under Section 27, it establishes a fund to be known as the Forest Conservation and Management Trust Fund. The objects of the Trust Fund shall be to nurture, promote, and support innovations and best practices in forest conservation and development, including the support of programmes for payment for ecosystem services. The Act sets up entities that may be involved in a PES. For example, it establishes KFS whose functions include to manage water catchment areas in relation to soil and water conservation, carbon sequestration, and other environmental services in collaboration with relevant stakeholders. It also makes provision for the setup of CFAs, and supports community participation in forest conservation and management through a management agreement between the KFS and a CFA.
Green Economy Strategy and Implementation Plan, 2016-2030	Existing	Seeks to, inter alia, pursue application of environment policy measures including Payment for Ecosystem Services and develop and apply tools of benefit sharing to support Payment for Ecosystem Services. One of the GESIP strategies set out is to upscale PES in Water Towers within the 2015-2020 timeframe.
National Climate Change Action Plan, 2018-2022	Existing	Strategic Objective 4 is to increase forest/tree cover to 10% of total land area; rehabilitate degraded lands, including rangelands; and increase resilience of wildlife. One of the actions to meet this objective is reduced deforestation and forest degradation through enhanced protection of an additional 100,000 million ha of natural forests through such initiatives as financial innovations, including payments for ecosystem services and carbon markets.
Kenya's First Nationally Determined Contribution (Updated), 2020	Existing	The updated NDC includes a mention of PES, providing that one of Kenya's mitigation priorities is "harnessing the mitigation benefits of the sustainable blue economy, including coastal carbon Payment for Ecosystem Services (PES)".
Kenya Water	In draft	Proposed to replace the Kenya Water Towers Authority Order, 2012, upon its enactment. It establishes the Kenya Water Towers Authority

Law / policy	Existing/In draft	PES relevance
Towers Bill, 2019		whose functions under Section 7 are set out to: mobilise resources through PES, including carbon reservoirs and sequestration; develop and implement a PES framework in consultation with lead agencies; and undertake Total Economic Valuation (TEV) of all water tower ecosystems in the country to support implementation of an effective PES framework. Under Section 40 (2), the Cabinet Secretary may, on recommendation of the Kenya Water Towers Authority, make regulations to provide for PES, and provide for an effective PES framework.
Sustainable Waste Management Bill, 2019	In draft	The Sustainable Waste Management Bill is a proposed law to establish an appropriate legal and institutional framework for the efficient and sustainable management of waste in the framework of the green economy, the realisation of the zero-waste goal, the Constitutional provision of the right to a clean and healthy environment for all, and connected purposes. Under Section 5 of the Bill, one of the general principles of the Act is set out to be payment for ecosystems services. The Bill however does not elaborate further on this. It is currently under discussion.
Second National Forest Policy, 2020	In draft	Makes greater provision for PES than the current forestry policy. Its key provisions on PES include that it: • Recognises that emerging issues such as PES raise the need for a new policy and highlights that Kenya is a member of the Common Market for Eastern and Southern Africa (COMESA), which has a forest management strategy that outlines key investments in the forestry sector such as payments for environmental services. • Sets out that evaluating and strengthening the concept of PES should be explored and the critical role of county governments in this regard acknowledged. • Highlights that at present, PES in Kenya largely depends on external subsidies, with very little input from the private sector and direct beneficiaries of ecosystem services. It adds that PES requires a supportive policy and regulatory framework that enables making and receipt of payments, protection of rights of buyers and sellers as well as providing safeguards for monitoring and enforcement. It provides that the National Government shall: provide incentives for investing in ecosystem services and develop formal guidance for industry on PES business models; and create awareness of ecosystem services and build capacity for various PES options. It also provides that the Government shall enhance resource mobilisation strategies through carbon financing, payment for environmental services, and other appropriate mechanisms.

Source: Various sources. Review undertaken by Kieti Advocates and Pollination

5.3 Relevant laws related to select ecosystem services

Global Climate Regulation

PES is expressly encouraged as elaborated in the National Climate Change Action Plan 2018 – 2022 which highlights Kenya's goal to use financial innovations, including payments for ecosystem services and carbon markets to reduce deforestation and achieve low carbon climate resilient development.[25] However, how PES fits within Kenya's broader climate regulation framework is currently unclear.

[25] Government of Kenya, (GoK), The National Climate Change Action Plan 2018 – 2022, (GoK, 2018)

Kenya's legal and regulatory framework does not set out explicit modalities for PES projects structured alongside payment for carbon sequestration and avoided deforestation initiatives and the Government has been more focused on carbon benefits achieved through non-PES policies like carbon markets. As noted above, Kenya is currently developing its approach to jurisdictional REDD+ and has established the National Experts Group on REDD+ to advise the Government on how to transition to jurisdictional REDD+ and nest REDD+ projects.

The legal analysis related to the ownership of the emission reductions would be similar whether the reductions were monetised through a PES scheme or in carbon markets. The default 'owner' of the carbon benefit would be the landowner undertaking activities that increase carbon sequestration on their land, whether private, community or public land. In the case of a public forest, KFS involvement and consent will be necessary to be able to monetise such activities. An individual, organisation or community may also be granted rights under the FCMA to undertake carbon activities, through either of the following agreements, that would need to expressly allow the carbon sequestration activity:

- Concession agreements – These are long term agreements issued by KFS for the management of a specified public forest area at a price determined after forest valuation and bidding.[26] This grants an individual or organization the right of use in respect to a specific area in a public forest, for the purpose of commercial forest management and utilization.[27] The concession agreement is required to detail the purpose of the concession[28] and the concessionaire is also required to develop a concession management plan once every five years and an annual operation plan which is to detail all operations to be undertaken in the forest.[29] These plans are to be approved by the KFS and activities are not to commence prior to the approval of the operations plan.[30] This would suggest that all planned activities in relation to a PES project require to be included in the concession, and in the forest management and operation plans that would be subject to approval by KFS.
- Management agreements – The FCMA also allows for KFS to enter into management agreements with CFAs for sustainable conservation of a public forest and use of forest resources. Various user rights may be granted to the CFA in the management agreement, including benefits of carbon sequestration activities which may from time to time be agreed upon between an association and the Service.[31]

Kenya is currently in the process of developing climate change regulations under the Climate Change Act, 2016, and the regulations may have a bearing on a global climate regulation PES scheme, as enumerated in Table 21:

Table 21: Climate change laws and regulations in Kenya and the implications on PES

Climate change law/regulation	Implications for a PES scheme
Draft Climate Change (Duties and Incentives) Regulations, 2021	The draft regulations place climate change duties upon public and private entities as required by the Climate Change Act, 2016. The private sector entities upon whom duties are placed are highlighted in the First Schedule to the regulations. Duties imposed on these private sector entities include to align their mitigation and adaptation objectives to national climate change priorities, and

[26] Section 2, FCMA
[27] *ibid*
[28] Section 44 (4), FCMA
[29] Regulation 37 and Regulation 5(4) respectively of the Forests (Participation in Sustainable Forest Management) Rules, 2009
[30] Regulation 5(4), Forests (Participation in Sustainable Forest Management) Rules, 2009
[31] Section 49 (2) (k), FCMA.

	to commit a financial contribution to climate change activities. If passed into law, in their present form, these draft regulations are likely to encourage private entities to participate in climate change related PES schemes as voluntary buyers, increasing interest and uptake of PES in Kenya.
Draft Natural Resources (Benefit Sharing) Regulations, 2020	The draft regulations provide a framework through which any benefits accruing from the use of natural resources can be shared between resource exploiters, the national government, county governments and local communities. The natural resources identified by the regulations are water resources; forests, biodiversity and genetic resources; and wildlife resources. Under the Bill, the use of a natural resource for commercial benefit is deemed exploitation, and necessitates a benefit sharing in accordance with the provisions of the Bill. If passed into law, the draft regulations will provide a clearer framework on benefit sharing mechanism in the operation of PES schemes involving the identified natural resources, depending on how the PES is structured and whether it can be considered exploitation of a natural resource for commercial benefit.
Draft Climate Change Act (Monitoring, Reporting and Verification), Regulations, 2021	The Draft regulations include carbon sequestration activities as reportable and verifiable mitigation actions under the regulations, placing reporting responsibilities on PES/REDD+ proponents. The forestry actions covered in the regulations include: afforestation or reforestation on land size of 10 hectares or more that contributes to Kenya's 10% tree cover goal; and REDD+ activities on a land size of 10 hectares or more, including site-scale REDD+ activities involving: • Reduction of deforestation through enhanced protection of areas gazetted as forest and conservation areas; • Reduction of forest degradation through enhanced protection of areas gazetted as forest and conservation areas; • Restoration of degraded forest landscapes in gazetted forest and conservation areas located in arid and semi-arid areas and rangelands; and • Afforestation or reforestation of grasslands located in arid and semi-Arid areas and rangelands.

Source: Various sources. Review undertaken by Kieti Advocates and Pollination

In practice, Kenya has largely approached carbon benefits in the context of REDD+ projects rather than PES schemes. Nonetheless, a carbon regulation PES is a possibility under Kenya's laws and should be structured in locations without established REDD+ projects to limit possibility of double-counting and risks that there are multiple claims to the same carbon benefit.

Biodiversity

Kenya's biodiversity legal and regulatory framework does not contain explicit requirements on PES. The framework however is clear that it aims to promote equitable sharing of benefits accruing from the utilisation of biodiversity and ecosystem services.

The Kenya National Biodiversity Strategy and Action Plan 2019 – 2030 for example,[32] sets out the promotion of fair and equitable sharing of benefits accruing from utilization of biodiversity and ecosystem services amongst its goals. The plan targets to engage local communities living in key biodiversity areas since they are the primary beneficiaries and burden-bearers of biodiversity conservation. The plan proposes engaging these communities in sustainable livelihoods improvement programmes and income generating activities that promote biodiversity conservation.

[32] Government of Kenya, Kenya National Biodiversity Strategy and Action Plan 2019 – 2030, (GoK, 2019).

The regulatory framework also prioritises the conservation of threatened species. The Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, and Access to Genetic Resources and Benefits Sharing) Regulations, 2006 specifically provide that the National Environmental Management Authority (NEMA) shall, in consultation with the relevant lead agencies, impose bans, restrictions or similar measures on the access and use of any threatened species in order to ensure its regeneration and maximum sustainable yield.[33]

A PES project on biodiversity may be based on payments for the protection of key habitats that encourage vibrant breeding population of diverse flora and fauna.[34] PES projects on biodiversity in Kenya may also be focused on wildlife programmes as exemplified in Box 5,

Box 5: The Olare Orok Conservancy (OOC)

A PES program whereby pastoral landowners living adjacent to the Maasai Mara National Reserve (hereafter 'the Mara Reserve') are paid 41 USD (at 2011 rates) per hectare annually to relocate their settlements and partially exclude livestock grazing inside the Conservancy, which is reserved for high-end wildlife tourism. The program was launched in 2006 with a few landowners and by 2012 had enrolled 217 landowners in the Olare Orok and the Motorogi Conservancy covering an area of 15,200 hectares. In 2012, the program disbursed a total of 426,400 USD which was paid to the 217 participating households translating to an annual average of 2000 USD per family. The OOC follows a 'user financed' model because the money used to pay the landowners enrolled in the program comes from private sector companies involved in the wildlife tourism industry.

Source: Osano, et al. (2017)

Regulation of wildlife is guided by the Wildlife Conservation and Management Act, 2013 (WCMA). One of the general principles of the WCMA is that benefits of wildlife conservation shall be derived by the land user in order to offset costs and to ensure the value and management of wildlife do not decline.[35] The WCMA establishes the Kenya Wildlife Service (KWS) whose functions include conservation and management of national parks, wildlife conservation areas, and sanctuaries under its jurisdiction, and development of benefit sharing mechanisms for communities living in wildlife areas.[36]

Where the prospective PES scheme is located in Mount Elgon National Park, a gazetted wildlife protection area, the involvement and approval of KWS will be necessary. In the case of Chepkitale National Reserve, County Government involvement and approval may be necessary, if the County Government has not entered into a management agreement with any management agent or KWS, for the management of the national reserve.[37]

Additionally, the FCMA enables the establishment of a biodiversity PES through conservation agreements. According to the FCMA, a forest owner may enter into an agreement with any person for the joint management of any forests for a period to be specified in the agreement.[38] Such an agreement may enjoin the person to use or refrain from using such forest or any part thereof in order to ensure the conservation of biodiversity, provided that where an agreement enjoins such person to use or refrain from using the forest in any particular manner, it shall contain modalities of payment of

[33] Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, and Access to Genetic Resources and Benefits Sharing) Regulations, 2006, regulation 5 (1).
[34] Langat D., et al, *Guidelines for Establishing Payment for Ecosystem Services Schemes in Kenya*, (KEFRI, 2017).
[35] Section 4 (e), WCMA.
[36] Section 7 (a) and (f), respectively, WCMA.
[37] Section 35, WCMA.
[38] Section 41 (1), FCMA.

compensation to such person for any loss incurred.[39]

An example of how a conservation agreement could be structured under a PES scheme in the proposed area is an arrangement between KFS as forest owner, a CFA, as the entity involved in joint management with KFS, and an ecosystem service buyer coming in to provide compensation for steps taken in biodiversity conservation.

5.4 Mount Elgon PES scheme land ownership

Mount Elgon water tower was gazetted under the Water Towers Agency Order in 2012. It is a unique ecosystem where a forest reserve and a national park extend and border with the local communities.

Government forests, Government game reserves and national parks are categorised as public land in the Constitution of Kenya and are held in trust by the National Government for the people of Kenya.

In terms of administration, Mount Elgon National Park falls under the jurisdiction of the Kenya Wildlife Service (KWS), as mandated in the Wildlife Conservation and Management Act, 2013 (WCMA). Chepkitale National Reserve is managed by the County Government in accordance with the provisions of the FCMA, although the County Government may, with approval of the Cabinet Secretary after consultation with the National Land Commission, enter into a management agreement with any management agent or the KWS, for the management of a national reserve. It is not clear whether such a management agreement has been entered into for the management of Chepkitale National Reserve.

Mount Elgon was gazetted as a Government forest reserve in 1932. It is also gazetted as a public forest, under the Forest Conservation and Management Act (FCMA), 2016. By virtue of this gazettement, the National Government is recognized as the owner of the forestland as set out in the Constitution. The Kenya Forest Service (KFS) has management functions over the forest, as all public forests in Kenya are vested in KFS. KFS may however grant rights of user in respect of a public forest to another person. As noted above (Section 5.2.1(, this could be through:

- Concession agreements – these are long term agreements issued by KFS for the management of a specified public forest area at a price determined after forest valuation and bidding. This grants an individual or organization a "forest concession" which is a right of use in respect to a specific area in a national or county forest by means of a long-term contract, for the purpose of commercial forest management and utilization. "Commercial use" is defined to mean any use of forest products or forest land, other than direct use for personal purposes or infrastructure development and it includes uses involving trade or any other disposition of forest products or forest land for direct or indirect financial benefits. It is unclear whether Mount Elgon forest or a portion thereof is subject to a concession agreement, and if it is, to what extent local communities have a role to play under the concession agreement, as required to include community user rights and benefits.
- Joint management agreements – this is an authorisation granted by the KFS or the County Department responsible for forestry, to enter into partnership with other persons for the joint management of a specified forest area, specifying the contribution, rights and obligations of each party and setting out the methods of sharing the costs and benefits accruing from the forest so managed.

Under this mechanism, local communities may utilise public forests where the local community organises and registers as a Community Forest Association (CFA), and applies to KFS for permission to

[39] Section 41 (2), FCMA.

participate in the conservation and management of the forest.

Where a CFA is granted the permission sought, it enters into a management agreement with KFS. This grants the CFA a variety of forest user rights, including the right to enter contracts to assist in the carrying out of specified forestry operations. Under the FCMA, a CFA may enter into partnerships with other persons for purposes of ensuring efficient and sustainable conservation and management of the forest, after obtaining approval from the KFS, and such partnerships as may be in relation to PES.

CFAs exist in the prospective PES scheme area, however, it is unclear whether they have entered management agreements with KFS, granting the communities user rights and obligations in the project area.

5.4.1. IMPLICATIONS OF THE FOREST OWNERSHIP ON THE PES SCHEME

Based on this analysis, the prospective PES scheme would need the approval and participation of KFS, KWS and County Government, where the national reserve is under the management of the County Government and not KFS. This is based on the oversight mandate bestowed on these entities in public land.

The prospective PES scheme will also need to be clear on whether there are other users granted rights to the public land, for example concessionaires operating in the project area or a CFA in the project area that has a management agreement with KFS. These entities would be critical to include in the PES scheme as ecosystem service providers, given their conservation role in the project area.

It is also important to note that the prospective PES scheme area has been the subject of disputed ownership, as highlighted in greater detail in Appendix B. Due to disputed ownership, certain parts of the Mount Elgon forest such as the Chepyuk settlement area are in the process of de-gazettement under the procedure set out in the FCMA, for the change of boundary of a public forest. If PES scheme activities were to fall within a degazetted forest area, the providers of the ecosystem services would be private landowners. This is unlike in the case of the gazetted forest, where the ecosystem service providers as community members would be a CFA holding a management agreement with KFS. It is therefore necessary to have clear determination of the exact PES scheme area, to determine whether the scheme fell inside or outside the gazetted forest area and therefore to determine the rightful ecosystem service providers and beneficiaries of the proposed ecosystem services.

5.4.2. RECENT LEGAL DISPUTES INVOLVING LAND OWNERSHIP AND EVICTIONS

The Mount Elgon Forest area under dispute is gazetted as a public forest, though this gazettement is currently under contestation.

As the gazettement of Mount Elgon has not been declared an illegality by a Court of law, nor been degazetted by Parliament as allowed in the FCMA, any dealings with such land have to recognize the rightful ownership of the National Government and the management of the KFS in whom public forests in Kenya are vested. A PES project may be carried out provided it recognises that in a public forest, any persons with rights on the land would legally need to operate with KFS authorisation as outlined in the FCMA. This is through, inter alia, concessions and management agreements that outline the forest user rights granted to the parties and their obligations.

Whereas the provisions of the National Forest Policy, 2014 call on the Government to encourage voluntary conservation easements and this policy statement is also echoed in the Draft National Forest Policy, 2020, there are no clear provisions on how forest conservation easements are to be operationalised. As such, under the current legal framework, for communities to live in a public forest with some conservation protections on the land, they do so under the FCMA recognized mechanism of a registered Community Forest Association (CFA) that has sought permission from the KFS to participate in forest management and conservation or where they are granted a concession under

the terms of the FCMA.

Where a CFA is granted the permission sought, it enters into a management agreement with KFS. This grants the CFA a variety of forest user rights, including the right to enter contracts to assist in carrying out of specified forestry operations. Under the FCMA, a CFA may enter into partnerships with other persons for purposes of ensuring efficient and sustainable conservation and management of the forest, after obtaining approval from the KFS. Such partnerships may be in relation to PES.

Therefore, in the prospective PES project, the rightful community to benefit from the PES scheme in the public forest is the one which the project proponent determines, either has a concession agreement, or:

- is organized as a CFA in the project area;
- has a management agreement with KFS;
- the management agreement has not been terminated under Section 51 of the FCMA; or
- KFS has approved the partnership for PES between the project proponent and the CFA.

It is important to determine early on whether the prospective PES scheme area has a CFA with a valid management agreement in place. It is equally important to confirm that any management agreement between KFS and the CFA has not been terminated/is not in the process of termination, given the recent forest evictions and the likely sour relationship between the parties.

This information may be sought from KFS who are obliged to maintain an up to date record of all CFAs that have been granted permission to participate in the conservation and management of a public forest, though the FCMA does not set out this information as public nor set out the procedure to be followed for obtaining the information. Generally, an inquiry suffices.

This information can also be requested through the Access to Information Act, 2016 which guarantees every citizen a right to information held by the State. Under the Act, once a request is made this information should be provided expeditiously at a reasonable cost.

This information may also be sought from discussion with the local community. The FCMA sets out a detailed process of termination or variation of a management agreement and the community would therefore know whether their management agreement with KFS is in force. Prior to termination, the Chief Conservator is to notify the CFA at least thirty (30) days before the management agreement is terminated or the user right is withdrawn. The CFA is to be given an opportunity to challenge the decision and may appeal against the decision to the Board of KFS.

As such, the implications of the forced evictions on the PES scheme area are mainly that any PES scheme needs to be clear on the exact parts of Mount Elgon forest the project is to be undertaken with respect to in order to understand whether it is outside or within the gazetted forest area, and as such who owns the forest and is the rightful project beneficiary as set out in this report.

More detail on relevant court cases involving contested land rights and forced evictions is provided in Appendix B.

5.5 Findings

Whereas Kenya does not have an overarching legal or regulatory framework setting out the modalities of how a PES project is to work, different sectoral laws provide an enabling environment for the implementation of voluntary PES schemes focused on different specific ecosystem services. We note that this is an evolving area—the Government has a national PES group that is providing recommendations on national level policy and is developing its approach on jurisdictional REDD+ that

would affect REDD+ projects and the sale of carbon credits. Both of these activities may affect a voluntary PES scheme and should be closely monitored to evaluate the extent to which they may affect the analysis.

As modelled under the structure highlighted in Figure 13, there are no impediments for the prospective PES scheme. However, the following pointers need to be borne in mind:

- Given the contested land ownership, it is necessary to have clear determination of the exact PES scheme area, to determine whether the project falls inside or outside the gazetted forest area and therefore to determine the rightful ecosystem service providers (sellers) of the PES scheme. There is need to determine what permissions have been granted to local communities to use the forest, if any, where ownership is vested in KFS.
- Depending on the nature of the PES scheme, activities focused on and the exact scheme area, the informed consent of KFS, KWS and the County Government will need to be sought as has been highlighted in this report.
- Kenya's legal framework envisions community participation in environmental management through diverse community entities such as CFAs, WRUAs and CWAs. It is not clear to what extent CFAs, WRUAs and CWAs are in existence in the proposed project area, and this will need to be clarified. It is ideal though not mandatory, that where these community entities exist in the PES scheme area, they are involved in the proposed voluntary PES, as the entities would be useful for collaborative management of ecosystem resources in the area.
- For a PES on global climate regulation, it will need to be ascertained that there is no concurrent ongoing REDD+ project in the same area as the PES scheme, as the right to carbon from the same activities could not be also transferred to the PES buyers where the sellers have already transferred that right in the carbon credit under the REDD+ project. If it were to be sold in the PES scheme, it would result in double-claiming of the same benefit by the carbon credit holders and the PES buyers.
- In addition, the ongoing moratorium on logging of timber from public and community forests will need to be closely monitored for clarity on which forests have harvesting allowed and on what terms.

Consideration of these findings should be taken in to account the next steps of the PES scheme design and Implementation.

6. Risk assessment and gap analysis

An outline of the risks to a potential PES scheme, their potential risk rating ('High', 'Medium', 'Low') and potential mitigation measures are set out in Table 22. These risks and mitigation actions were supported by feedback from stakeholder workshops in December 2021 and subsequently finalised. Preliminary risk rating based on the likelihood and severity of risks. At this stage this is an indicative risk assessment which should be updated/revised in Stage 2.

Table 22: Potential risk factors and mitigation measures for a Mount Elgon PES

Risk	Risk Rating (Likelihood/Severity)	Potential mitigation measures
Ensuring additionality criteria are met (i.e. payments are made for actions over-and-above those which land or resource managers would generally be expected to undertake)	Medium/High	Ensuring the PES payments support activities that are not already being undertaken is important to demonstrate additionality and system credibility. This is particularly the case in the Mount Elgon landscape where there are several sustainable land management and small-scale carbon offset projects ongoing. Any prospective PES scheme will need to demonstrate a clear need for the finance generated by the payments, i.e. by demonstrating that forest protection and enhancement would not happen in the absence of payments or that such activities would not be sustainable given the costs of conservation and/or variability or unreliability of finance from other sources.
Lack of interest from stakeholders in being a part of a potential PES scheme	Low/High	Extensive stakeholder consultation should be undertaken in Stage 2 in order to identify the potential stakeholder groups who may be interested in, or impacted by the scheme and steps should be taken to address their concerns.
Challenges of aggregating geographically dispersed farmers and other land managers	Medium/High	It is possible that not all smallholder, subsistence farmers will want to engage in the scheme initially and/or land managers may be spread out over large areas. To overcome this, the potential for a 'grouped' carbon offset project could be explored. Grouped projects combine multiple project activity instances into a single, combined project within a defined geographic boundary (e.g., the Mount Elgon Water Tower) that adds new instances over time. Using VCS requirements for grouped projects, a project proponent may avoid undergoing a full validation for each new instance added to the project. This can allow projects to scale up over time and reduce transaction costs. A grouped project is similar to the UN Clean Development Mechanism (CDM) Program of Activities (PoA).
Lack of clarity over land rights and ownership of the services provided by forests such as carbon credits	High/High	Land ownership needs to be established early on in Stage 2. As detailed in the legal analysis, It is important to note that the PES scheme area has been the subject of disputed ownership, as highlighted in greater detail in Section 5 and Appendix B. Due to disputed ownership, certain parts of the forest such as the Chepyuk settlement area are in the process of degazettement under the

Risk	Risk Rating (Likelihood/Severity)	Potential mitigation measures
		procedure set out in the Forest Conservation and Management Act (FCMA), for the change of boundary of a public forest. If the PES scheme activities fall within a degazetted forest area, the providers of the ecosystem services would be private landowners. This is unlike in the case of the gazetted forest, where the ecosystem service providers as community members would be a CFA holding a management agreement with KFS. It is therefore necessary to have clear determination of the exact PES scheme area, to determine whether the PES scheme falls inside or outside the gazetted forest area and therefore to determine the rightful ecosystem service providers and beneficiaries of the proposed ecosystem services. There is need to determine what permissions have been granted to local communities to use the forest, if any, where ownership is vested in KFS. REDD+ schemes (and other carbon schemes) in Kenya provide examples of how forest management projects can be set up to ensure that access rights for ecosystem services are guaranteed.
Failure to raise sufficient upfront capital to initiate the PES scheme	High/High	While the feasibility assessment suggests that the benefits of a carbon-based PES scheme could outweigh the costs (as long as a price premium is reached), it is important to note that there is a potential time lag between the initiation of a scheme and the point at which the sellers of ecosystem services receive payments. In order to ensure there is sufficient incentive for sellers to engage in a scheme, payments may need to be paid early on in the scheme. As such initial funding is likely to be required both to cover the costs of setting up the scheme but also to provide the initial incentives for sellers to become involved. The feasibility assessment can provide indicative estimates of the level of funds required. Potential partners for providing funds (e.g., organisations looking for investable carbon projects which could secure them a supply of carbon offsets in future under an arrangement to be agreed) should be engaged in Stage 2.
Uncertainty around laws and regulations in development which may affect a potential PES	Low/High	The legal analysis emphasised that Kenya is currently in the process of developing climate change regulations under the Climate Change Act, 2016, and the regulations may have a bearing on a global climate regulation PES scheme. It should also be noted that the Government has established a national level working group on PES that is intended to set national-level PES policy. This group has not published any recommendations as yet, but its actions should be monitored to the extent it impacts a voluntary PES scheme. In addition, the Government is currently engaged in implementing its climate-related commitments under the Paris Agreement, including its approach to carbon markets and REDD+ and the establishment of a jurisdictional REDD+ program. This implies that the Government will be regulating carbon benefits from REDD+ through climate regulations rather than including carbon as part of PES. The development of climate regulation more broadly and specific actions

Risk	Risk Rating (Likelihood/Severity)	Potential mitigation measures
		on REDD+ (jurisdictional and nesting policies) may demonstrate that the Government is likely to primarily regulate carbon through these means rather than through a PES policy. As such the Government has a national PES group that is providing recommendations on national level policy and is developing its approach on jurisdictional REDD+ that would affect REDD+ projects and the sale of carbon credits. Both of these activities may affect a voluntary PES scheme and should be closely monitored to evaluate the extent to which they may affect the analysis.
Insufficient institutional capacity and resources to effectively implement, monitor, and evaluate the scheme	Low/High	The Government of Kenya should be engaged in the design of the PES scheme and any institutional issues will need to be discussed and resolved in Stage 2. The carbon aspects of the scheme should be relatively straightforward to implement and there is a wealth of experience to draw on. Nevertheless, appropriate partner organisations may need to be identified in Stage 2 to support the scheme's further development and implementation. Consultation would be essential to identify potential levels of institutional support, for example potentially from within the Ministry of Environment and Forestry, and the Ministry of Agriculture.
Inability to achieve the necessary price / price premium	Medium/High	Based on the feasibility assessment, a potential carbon scheme at Mount Elgon would need to achieve around $30 per tCO2e (KES 3,200) in order to at least equal costs, and a higher price would be needed for estimated benefits to outweigh costs. At present, this is significantly higher than the average price for nature-based carbon credit generation. However, many global organisations and carbon market specialist groups (e.g., the World Bank, UNFCC, UNEP) project a significant increase in the carbon price in the short and medium term - with some estimates predicting increases in the order of 10 to 20 times higher than today's prices (McKinsey, 2021; S&P Global, 2021; UCL & Trove Research, 2021) (see Section 3.3.4 for more detail). In the UK in 2021, a Trees for Life carbon project increased the sale price for credits (due to unprecedented demand) to £38 per credit (around $50 and KES 5,700) (Trees for Life, 2021). Therefore, the feasibility of achieving a price of $30 or above (noting that this potential scheme for Mount Elgon would be delivering additional environmental and social benefits) may be possible in the near future. It is recommended that carbon calculations and assumptions are revisited in Stage 2 and that this analysis is revisited in line with price changes overtime.
Insufficient demand and/or high transaction costs meaning that the revenues do not exceed the costs	Medium/High	Initial modelling has been undertaken as part of the Stage 1 feasibility assessment which suggests that, as long as the appropriate price level is reached, benefits are likely to outweigh scheme costs overtime. These findings are, however, based on high-level information and need to be validated using more detailed, project-specific information. This should include consideration of the transaction costs that would be incurred in engaging with buyers and sellers, as well as the costs that would be

Risk	Risk Rating (Likelihood/Severity)	Potential mitigation measures
		incurred in project development, validation, monitoring and verification.
Unexpected events which may undermine the agreed interventions such as wildfire, drought, or invasive species damaging planted areas	Medium/Medium	There is likely to be a buffer whereby a certain proportion of carbon credits that are withheld to account for these unexpected risks (for example, there is a buffer required for any project under VCS). There is also the potential that unexpected events could be mitigated through the creation of a Government compensation fund or through building in insurance cover as part of the payment scheme. Any such compensation or insurance programme should align with any accreditation scheme used.
Potential unforeseen negative impacts that may arise such as increases in income inequality, issues of power imbalance, and gender issues	Medium/Medium	The impacts of the scheme on livelihoods and wider social wellbeing should be included as part of the monitoring plan in Stage 4. If negative impacts arise in terms of income distribution or power imbalances, then the design of the scheme should be revised to address these issues. Developing the scheme from the outset with equity and inclusion as key pillars, along with effective stakeholder engagement, should also help to mitigate this risk.

Note: Preliminary risk rating based on the likelihood and severity of risks.

7. Next steps

The final step of this project was to develop a PES Action Plan for Mount Elgon. The feedback from stakeholder workshops throughout Stage 1 has informed the development of the plan – outlining the necessary activities to move to the next stages of PES design and implementation – "Stage 2: Prepare". The aim of Stage 2 is to prepare a more detailed plan setting out how the scheme could be implemented on the ground, including targeted stakeholder engagement as the scope of a prospective PES project becomes clearer and moves towards more detailed design.

For further information and guidance on the design and implementation of a PES scheme, please see the GNIplus toolkit, accessible here: https://planengageuk.alytics.com/aecom-pes-toolkit/home

The PES Action Plan (overleaf) outlines key activities that could be undertaken by stakeholders in the short, medium, and long-term to move through Stage 2. It is the hope of the GNIPLUS Partners and the study team that relevant organisations and/or groups within the Mount Elgon region agree a way to assign and adopt these actions to continue the work of developing a bundled PES scheme in the area.

Following completion of Stage 2, the next stages would then be to:

- Set up and implement the scheme on the ground, and
- Evaluate the impacts of the scheme, using any lessons learned from the evaluation to revise the scope and parameters of the scheme in future years.

This Payments for Ecosystem Services (PES) Action Plan is a key deliverable of the Mount Elgon PES Scoping Study undertaken under the GNIplus project. The Mount Elgon PES Scoping Study was structured around the objectives of **Stage 1: Scope** of the four stage PES framework (see Figure), as follows:

- Assess scheme feasibility,
- Set out scheme parameters,
- Undertake a legal review, and
- Identify potential risks and mitigation measures.

Together, the four stages of the PES framework are intended to be **part of an ongoing, iterative process** through which a PES scheme can be continually refined and improved.

The findings of Stage 1 indicate that there is **potential for setting up a bundled PES focused on carbon sequestration and storage**. The design of the scheme would support the implementation of interventions aimed to promote carbon sequestration, as well as enhance the delivery of a wider range of ecosystem services; this would include biodiversity conservation, water quality regulation, pollination, and soil quality while also improving livelihoods.

Because of the additional benefits provided as part of this scheme, the carbon credits could be sold at a premium and the revenues used to support **additional conservation and livelihood improvement activities**. The interventions might include afforestation (through agroforestry), forest conservation (through reduced encroachment into forested areas) and more sustainable agricultural land management practices.

The feedback from stakeholder workshops throughout Stage 1 has informed the development of a PES Action Plan for Mount Elgon – outlining the necessary activities to move to the next stages of PES design and implementation – "**Stage 2: Prepare**". The aim of Stage 2 is to prepare a more detailed plan setting out how the scheme could be implemented on the ground, including targeted stakeholder engagement as the scope of a prospective PES project becomes clearer and moves towards more detailed design.

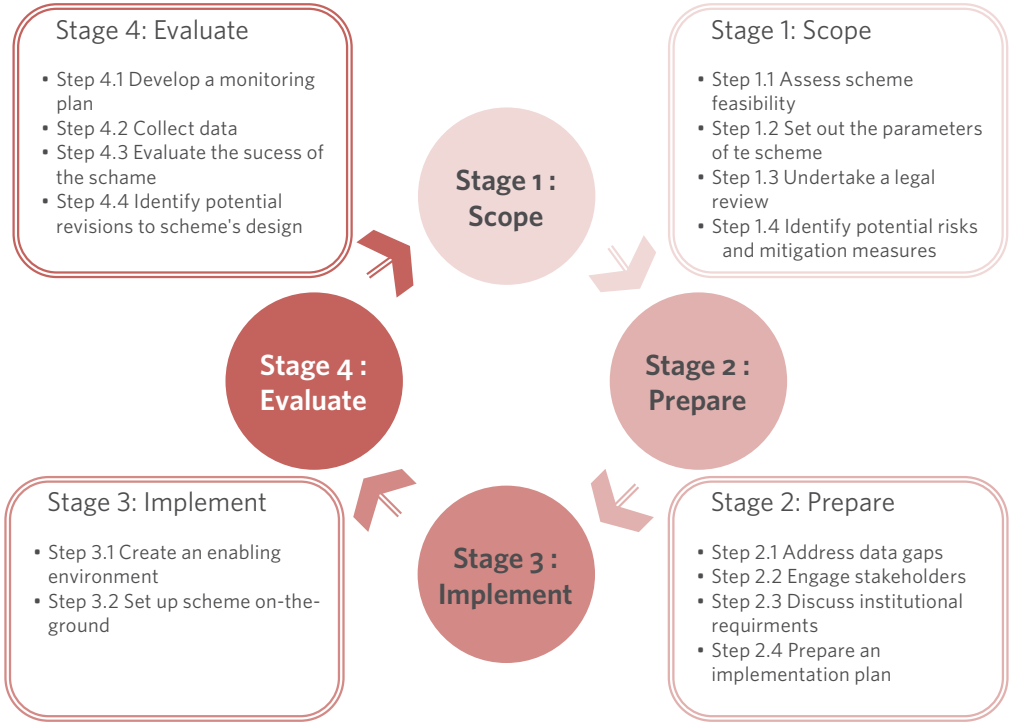
For further information and guidance on the design and implementation of a PES scheme, see the **GNIplus PES toolkit**:
https://planengageuk.alytics.com/chyulu-hills-dnca/home

The **Mount Elgon PES Action Plan** (overleaf) outlines key activities that could be undertaken by stakeholders in the short, medium, and long term to move through Stage 2. It is the hope of the GNIPLUS partners and the study team that relevant organisations and/or groups within the Mount Elgon region agree a way to assign and adopt these actions to continue the work of developing a bundled PES scheme in the area.

Following completion of Stage 2, **the next stages** would then be to:

- Set up and implement the scheme on the ground, and
- Evaluate the impacts of the scheme, using any lessons learned from the evaluation to revise the scope and parameters of the scheme in future years.

Outline of the four stage PES framework



Source: White, C., Smith, S., Rowcroft, P., Assefa, T., Black, J., Heaver, M., Lavers, A., Martin-Ortega, J., Moges, S., Mulligan, M,. & zu Ermgassen, S. (2016). Assessment of forest-based Payments for Ecosystem Services (PES) opportunities in Ethiopia: Final Report. Prepared for GGGI and Ethiopian Ministry of Forest, Environment and Climate Change.

Stage 2 : Prepare

	SHORT-TERM (6 months – 1 year)	MEDIUM-TERM (1 – 3 years)	LONG-TERM (3 years + or throughout PES)
Address Data Gaps	Undertake a **land tenure assessment** and develop a **detailed plan to identify specific geographic areas** for: i) forest protection, management and enhancement (in terms of condition), ii) implementation of agroforestry and other sustainable agricultural land management practices (including afforestation), iii) sustainable extraction of forest resources including designated areas for local communities to access the forest for the purposes of harvesting wood products, and iv) core biodiversity protection areas (which may align with forest carbon protection areas).	Use the geographic areas identified to **refine key components** from the feasibility assessment to **re-assess the estimated costs and benefits** of developing and operating a carbon offset project within the defined geography using more detailed, site-specific information. Explore the **potential of elephant carbon mechanism** and whether / how this may support a potential scheme.	Identify **key stressors on the ecosystem**, both in general and specific (as far as possible), in order to address these stressors and **mitigate them** through the scheme.
Engage Stakeholders	**Undertake comprehensive stakeholder consultation** to identify the potential stakeholder groups (including Community Farming Associations (CFAs) and informal settlers) who may be interested in, or impacted by, the scheme and steps should be taken to agree their role(s) in the PES and address their concerns. **A clear plan for community sensitisation and conflict mitigation and management** should be developed, including the identification of who will lead on these initiatives, when and how. **Engage with government / stakeholders in Uganda** to make them aware of the intentions on the Kenyan side of Mount Elgon. Undertake **formal engagement with relevant national government institutions** to endorse and support the implementation of the PES scheme.	**Review of lessons learned from previous studies** to agree key parameters with stakeholders, including contractual formats and payments. Conduct **community sensitivity analysis** and undertake **conflict mitigation and management activities.** **On-going assessment and inclusion of wider communities** (i.e. outside the current proposed project area) to be included as stakeholders as the PES scheme develops.	Continue to undertake **conflict mitigation and management activities** throughout the PES scheme timeline. **Monitor legal land disputes and outcomes**, maintaining close contact with parties involved.
Map Institutional Requirements	Use the findings of Kenya Forest Research Institute (KEFRI) (Langat et al, in publication)[1] to identify the **technical / institutional capacity of key stakeholders and technical experts.** Identify ways to fill any **capacity / knowledge gaps** and develop a **capacity building plan** with relevant organisations and PES stakeholders.	**Implement the capacity building plan** with required activities for local communities / government / CFAs and other actors.	**Continue to identify and undertake capacity building activities** throughout the timeframe of the implementation and operation of the PES scheme.
Prepare Implementation Plan	Clearly define the **PES scheme area, activities** to be undertaken by different stakeholders, and determine the rightful **ecosystem service providers and beneficiaries**. There is need to determine permissions for local communities to use the forest, for example where ownership is vested in Kenya Forest Service (KFS). Develop **financial plan** to support the set up and implementation of the PES scheme, as well as identify and apply for funding through appropriate sources.	Produce a **detailed environmental management plan** (aligned with those required by most carbon standards) and monitor according to a monitoring plan. **Monitor the actions of the Kenyan Government national working group on PES** – established to set national-level PES policy. This group has not published any recommendations as yet, but its actions should be monitored to the extent it impacts a voluntary carbon PES scheme.	**Update the implementation plan regularly**, keeping it flexible and adaptable to conditions on the ground, monitoring how it's working etc. Ensure that the **monitoring tools / systems / technologies** needed are **fit for purpose** and **can be accessed** by all stakeholders.

[1] Langat D.K., Kisiwa A.K., Ojung'a S.O., Kiprop J.K., Leley N.C., Ongugo P.O., Cheboiwo J.K., Kagombe J.K (in publication). Analysis of organizations capacity to undertake PES schemes: A case study of Cherangany and Mt. Elgon Forest ecosystems.

Note: In order for the action plan to be successfully implemented, key stakeholders need to be identified to deliver the actions outlined above.

8. References

Adger, W. N., and Jordan, A. (2009). *In: Governing sustainability*, Cambridge University Press, Cambridge, UK, 2009.

Aalde et al. (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4 Chapter 4 Forest Land.

Altieri, M. A., Nicholls, C. I., Henao, A., & Lana, M. A. (2015). Agroecology and the design of climate change-resilient farming systems. *Agronomy for sustainable development*, *35*(3), 869-890.

Atisa, G., Bhat, M.G., McClain, M.E. (2014). Economic Assessment of Best Management Practices in the Mara River Basin: Toward Implementing Payment for Watershed Services. Water Resources Management. Vol. 28.

Ballatore, T. J., Olaka, L. (2015). Atlas of Mount Elgon. Prepared by the African Collaborative Centre for Earth System Science (ACCESS). Edited by Eric Odada and Daniel Olago. Published by USAID/IUCN. 54p.

Bennett, G., Nathaniel, C., and Hamilton, K. (2013). Charting New Waters: State of Watershed Payments 2012.

Birdlife International (2021). Important Bird Areas factsheet: Mount Elgon (Kenya).

Busch, J., Dave, R., Lee, H., Cameron, A., Rasolohery, A., Roehrdanz, P., Schatz, G. (2012). Climate change and the cost of conserving species in Madagascar. *Conservation Biology.*

Chami, R., Cosimano, T., Fullenkamp, C., Berzaghi, F., Espanol-Jimenez, S., Marcondes, M., Palazzo, J. (2020). On valuing nature-based solutions to climate change: a framework with application to elephants and whales.

Cheikh, M.; van Noordwijk, M.; Luedeling, E.; Neufeldt, H.; Minang, P.A.; Kowero, G. Agroforestry Solutions to Address Food Security and Climate Change Challenges in Africa. *Curr. Opin. Environ. Sustain.* 2014, *6*, 61–67

Chisikia, S. N., Yeom, C. (2021). Enhancing ecologically sustainable management of deadwood in Kenya's natural forests. *International Journal of Forestry Research.* Vol. 2021.

Chomba, S., Treue, T., & Sinclair, F. (2015). The political economy of forest entitlements: can community based forest management reduce vulnerability at the forest margin?. *Forest Policy and Economics*, *58*, 37-46.

CIFOR (undated) Enhancing Forest Landscape Restoration in Mount Elgon, Kenya. Insights from Participatory Prospective Analysis (PPA).

Claessens, L., Knapen, A., Kitutu, M. G., Poesen, J., & Deckers, J. A. (2007). Modelling landslide hazard, soil redistribution and sediment yield of landslides on the Ugandan footslopes of Mount Elgon. *Geomorphology*, *90*(1-2), 23-35.

Collins, T. (2020). Kenya faces timber shortage as demand for wood grows. *African Business.*

Conservation International (CI) (2016). Natural capital accounting across the Gaborone Declaration for sustainability in Africa.

Cuni-Sanchez, A., Sullivan, M.J.P., Platts, P.J. et al. (2021). High aboveground carbon stock of African tropical montane forests. *Nature* 596, 536–542.

Dasgupta S. (2017). Does forest certification really work?

Davenport, T. (1996). The Butterflies of Uganda-Annotated Checklist. Uganda Forest Department, Kampala, Uganda

De Groot, R., Luke Brander, L., Solomonides, S. (2020). Ecosystem Service Valuation Database (ESVD) Version December 2020.

Department for Environment, Food and Rural Affairs (Defra) (2016). Defra's PES Pilot Projects 2012-25.

Domke et al. (2019). 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4 Chapter 4 Forest Land.

Engel, S. and Muller, A. (2016). Payments for Environmental Services to Promote Climate-Smart Agriculture? Potential and Challenges. Agric. Econ. 2016, 47, 173–184

Fedele (2017). Landscape management strategies in response to climate risks in Indonesia.

Fedele (2017). Landscape management strategies in response to climate risks in Indonesia.

Floodlist (2020) Kenya – Lake Floods Displace Thousands, Damage Livelihoods. Floodlist News, 22 October 2020.

Food and Agricultural Organization of the United Nations (FAO) (2021). REDD+ reducing emissions from deforestation and forest degradation.

Fripp, E. (2014). Payments for Ecosystem Services (PES): A practical guide to assessing the feasibility of PES projects. Bogor, Indonesia: CIFOR.

Government of Kenya. 2010a. Revised REDD readiness preparation proposal Kenya. Submitted to the Forest Carbon Partnership Facility. Kenya Forest Service, Government of Kenya (GoK), Nairobi, Kenya.

Government of the Republic of Kenya (2019) National Bamboo Policy, 2019.

HM Treasury (2020). The Green Book central government guidance on appraisal and evaluation.

IIED (2008). All that glitters A review of payments for watershed services in developing countries.

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (2019). Global Assessment Report on Biodiversity and Ecosystem Services.

International Monetary Fund (IMF) (2020). The secret work of elephants.

Intergovernmental Panel on Climate Change (IPCC)(2019) Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)].

Intergovernmental Panel on Climate Change (IPCC) (2008). IPCC National Greenhouse Gas Inventory Programme, IPCC Guidelines and REDD Monitoring and Verification.

Kagombe, J.K., Cheboiwo, J.K., Gichu, A., Handa, C., Wamboi, J. (2018). Payments for environmental services: status and opportunities in Kenya. *Journal of Resources Development and Management.* Vol 40.

Kairu, A., Upton, C., Huxham, M., Kotut, K., Mbeche, R., & Kairo, J. (2018). From shiny shoes to muddy reality: understanding how meso-state actors negotiate the implementation gap in participatory forest management. *Society & Natural Resources*, *31*(1), 74-88.

Kansiime M.K., Wambugu. S. and Shisanya, C. (2013). Perceived and actual rainfall trends and variability in Eastern Uganda: Implications for community preparedness and response. *Journal of Natural Sciences Research* 3 (8):179–94.

Kenya Forest Research Institute (KEFRI) (2020). Socio-economic impact of forest harvesting moratorium in Kenya.

Kenya Forest Research Institute (KEFRI) (2018). Baseline report: water quality in Mt. Elgon and Cherangany Forest ecosystems/catchment.

Kenya Forest Service (KFS) (2021). Forester. Issue 30, January – June 2021.

Kenya Forest Service and Ministry of Environment, Water and Natural Resources (2013). Analysis of demand and supply of wood products in Kenya.

Kenya Ministry of Environment and Forestry (2018). Tree species matching in Kenya October 2018.

Kenya National Bureau of Statistics (2020). Economic Survey 2020.

Kenya News Agency (2020) *Hundreds Displaced as River Nzoia Burst Banks*, 18 April 2020.

Kenya Water Towers Agency (KWTA) (2018). Kenya Water Towers Status Report for Mt. Elgon.

Kinnaird, T.C., Kinyanjui, R.N., Ndiema, E.K., Powles, P., Powles, S.H. Walukana, E.M., Watene, P., Jovanelly, T., Kiura, P., Sanderson, D.C.W., Spencer, J.Q. (2014). Characterising luminescence stratigraphies in the Mount Elgon Caves (Chepynalil rockshelter and Kiptogot Cave) Luminescence dating report. For Scottish Universities Environmental Research Center.

Kisiwa, A. Langat, S., Gatama, S., J., Kiprop, J. Cheboiwo, J., Kagombe. (n.d). Community Perception of Ecosystem Services and Management Implications of Three Forests in Western Parts of Kenya.

KWS (2017). Annual Report 2017.

Langat, D., Cheboiwo, J., Kagombe, J., Kiprop, J., Gatama, S., Kisiwa, A., Okoth, S., Ghuza, A., Smith, N., Kanyanya, E., DeMeo, T., Kerkren, J., Doud, B. (2019). Economic Value of the Mau Forest Complex, Cherangany Hills and Mt. Elgon Water Towers in Kenya.

Larsen, T.B. (1991). The Butterflies of Kenya. Oxford University Press, Nairobi, Kenya.

Lederer, M. (2011). From CDM to REDD+ - what do we know for setting up effective and legitimate carbon governance? *Ecological Economics*, Vol. 70 (11).

Liu, G., Liu, Q., Song, M., Chen, J., Zhang, C., Meng, X., Zhao, J. Lu, H., (2020). Costs and carbon sequestration assessment for REDD+ in Indonesia.

Luz Benites-Lazaro, L. and Andrade, C. (2019). Clean Development Mechanism: Key Lessons and Challenges in Mitigating Climate Change and Achieving Sustainable Development. Reference module *in Earth Systems and Environmental Sciences.* Elsevier 2019.

Makenzi, P.M. (2016). Integrity of Mt. Elgon as a Biosphere Reserve, Water Tower and a Proposed Trans-boundary Biosphere Reserve. Presented to the "Mountains WorKESop" at the 4WCBRs March 14-17, 2016, Lima. Peru

Mangat, R. (2021). The elusive Elgon elephants.

Martin-Ortega, Ojea & Roux (2013) Payments for Water Ecosystem Services in Latin America: A literature review and conceptual model, *Ecosystem Services* 6 (2013)122–132.

Mbeche, R., Ateka, J., Herrmann, R., & Grote, U. (2021). Understanding forest users' participation in participatory forest management (PFM): Insights from Mt. Elgon forest ecosystem, Kenya. *Forest Policy and Economics*, *129*, 102507.

McKinsey Sustainability (2021). A blueprint for scaling the voluntary carbon markets to meet the climate challenge.

Meteoblue (2020). Climate Mount Elgon. *The East African* [online].

Millennium Ecosystem Assessment (MA) (2005). Ecosystems and human well-being synthesis report.

Ministry of Environment and Forestry of the Government of the Republic of Kenya (2018) Taskforce Report on Forest Resources Management and Logging Activities in Kenya, April 2018.

Mogoi, J., Obonyo, E., Ongugo, P., Oeba, V., & Mwangi, E. (2012). Communities, property rights and forest decentralisation in Kenya: Early lessons from participatory forestry management. *Conservation and Society*, *10*(2), 182-194.

Munday, C., Dyer, E., Hope, R., Olago, D. and Hirpa, F. (2020) Extreme rainfall and management of the Turkwel Gorge Dam in Kenya. REACH, 4 November, 2020.

Musau, J., Sang, J., Gathenya, J., & Luedeling, E. (2015). Hydrological responses to climate change in Mt. Elgon watersheds. *Journal of Hydrology: Regional Studies*, *3*, 233-246.

Nadir, S., Jaoko, V., Osano, P., Ongugo, P. (2019). Status of water quality in Mt. Elgon, Cherangany forested ecosystems and entire River Nzoia Catchment in Kenya. *Journal of Environmental Science and Engineering,* pp 37-54.

Nantongo, M., Vatn, A. (2019). Estimating transaction costs of REDD+. *Ecological Economics*, Vol. 156, February 2019, pp 1-11.

National Environment Management Authority (2017). State of the Environment. Part two: Biodiversity

Nyongesa, K. (2015). Fire management in forests and National Parks of Kenya, case studies at Kakamega, Mt. Elgon and Mt. Kenya Forest and National Park. In *Forestry*, 1st ed.; Ivan, G., Ed.; OmniScriptumPublishers: Saarbrücken, Germany, 2015; pp. 1–124, ISBN 978-3-639-79212-6.

OECD (2020). Tracking economic instruments and financing for biodiversity 2020.

Offsetguide.org (accessed July 2021). Voluntary Carbon Markets.

Okumu, B., & Muchapondwa, E. (2020). Welfare and forest cover impacts of incentive based conservation: Evidence from Kenyan community forest associations. *World Development*, *129*, 104890.

Olage, D., Owino, J.P. and Odada, E. (2015) *Building Resilience to Climate Change on Mt. Elgon: Policy Implications and Recommendations*. ACCESS/IUCN, 13pp.

Ongugo, P., Njguguna, J., Obonyo, E., Sigu, G. (2010). Livelihoods, natural resource entitlements and protected areas: the case of Mt. Elgon forest in Kenya. Kenya IFRI Collaborative Research Centre.

Osaliya, R., Wasonga, O.V. & Kironchi, G. (2019). Land conversion is changing the landscape in the semi-arid Kapir catchment, northeastern Uganda. *Journal of Rural Development,* Vol. 3, 913–923.

Osano, P. et al. (2017). Case Study: Biodiversity- and Wildlife Tourism-Based Payment for Ecosystem Services (PES) in Kenya", in Namirembe S, Leimona B, van Noordwijk M, Minang P, eds. Co -investment in ecosystem services: global lessons from payment and incentive schemes, (World Agroforestry Centre (ICRAF), 2017).

Potschin, M. B., Haines-Young, R. H. (2011). Ecosystem services: exploring a geographical perspective. *Progress in Physical Geography.* Vol. 35(5), pp. 575-594.

Redclift, M. (1997). Development and global environmental change. *Journal of International Development.* Vol. 9(3), pp. 391-401.

Republic of Kenya (2005). The Kenya Forests Act. Kenya Gazette Supplement No. 88 (Acts No. 7)

Republic of Kenya (2016). The Forest Conservation and Management Act No. 34 of 2016

Ruiz-Mirazo (2011). Two-year evaluation of fuelbreaks grazed by livestock in the wildfire prevention programme in Analusia (Spain)). *Agriculture, Ecosystems & Environment.* Vol. 141 (1-2).

S&P Global (2021). Why we need Biden's executive order on climate-related financial risk.

Salzman et al (2018). The global status and trends of payments for ecosystem services.

Salzman, J., Bennett, G., Carroll, N., Goldstein, A., Jenkins, M. (2018). The global status and trends of payments for ecosystem services.

Seddon, N., Chausson, A., Berry, P., Girardin, C. A., Smith, A., & Turner, B. (2020). Understanding the value and limits of nature-based solutions to climate change and other global challenges. *Philosophical Transactions of the Royal Society B*, *375*(1794), 20190120.

Smith, S., Rowcroft, P., Everard, M., Couldrick, L., Reed, M., Rogers, H., Quick, T., Eves, C. and White, C. (2013). Payments for Ecosystem Services: A Best Practice Guide.

Sumukwo, K., Kipkoech, A., Roba, A., Mwima, P., Omondi, H., Kairu, G., Osano, O., Matere, S. (2011). Financing provisions of Environmental Services in Mount Elgon Region for the protection of watersheds.

Tamburini, G., Bommarco, R., Wanger, T. C., Kremen, C., van der Heijden, M. G., Liebman, M., & Hallin, S. (2020). Agricultural diversification promotes multiple ecosystem services without compromising yield. *Science advances*, *6*(45), eaba1715.

The Katoomba Group (2008) Payments for Ecosystem Services: Getting Started A Primer.

Thygesen, S. H., Løber, T., Skensved, E. M., & Hansen, C. P. (2016). Implementation of participatory forest management in Kenya: A case study of Karima Forest. *International Forestry Review*, *18*(3), 357-368.

Trees for Life (2021). East West Wild Carbon Workshop Update (webinar). August 13, 2021.

UCL & Trove Research (2021). Future Demand, Supply and Prices for Voluntary Carbon Credits – Keeping the Balance

USAID (2021). Protecting East Africa's Natural Capital, the Cost of Inaction: A Preliminary Synthesis of the economics of Natural Capital in East Africa.

United Nations Environment Programme (UNEP) (2012). The Role and Contribution of Montane Forests and Related Ecosystem Services to the Kenyan Economy. Nairobi, Kenya: UNEP.

United Nations Framework Convention on Climate Change (UNFCCC) (2021). REDD+.

Von Holle, B., Yelenik, S., Gornish, E.S. (2020). Restoration at the landscape scale as a means of mitigation and adaptation to climate change.

Waruingi, E., Mbeche, R., Ateka, J. (2021). Determinants of forest dependent household's participation in payment for ecosystem services: evidence from Plantation Establishment Livelihood Improvement Scheme (PELIS) in Kenya. *Global Ecology and Conservation.* Vol. 26.

Warusawitharana, M. 2014. The Social discount rate in developing countries. FEDS Notes.

White, C., Smith, S., Rowcroft, P., Assefa, T., Black, J., Heaver, M., Lavers, A., Martin-Ortega, J., Moges, S., Mulligan, M,. & zu Ermgassen, S. (2016), 'Assessment of forest-based Payments for Ecosystem Services (PES) opportunities in Ethiopia: Final Report', Prepared for GGGI and Ministry of Forest, Environment and Climate Change.

World Afro-forestry Centre (ICRAF) (2020). Sacred Forest and environmental protection among the Gedeo of Southern Ethiopia.

World Bank (2020). State and trends of carbon pricing 2020.

Wunder (2005). CIFOR Occasional Paper No. 42 payments for environmental services: some nuts and bolts.

Yego, P., Mbeche, R., Ateka, J., & Majiwa, E. (2021). Forest-based livelihood choices and their determinants in Western Kenya. *Forest Science and Technology*, *17*(1), 23-31.

Appendices

Appendix A. Tree-planting on cropland and agroforestry

Farming and agriculture are the main economic activities for 50% of forest-adjacent communities in Mount Elgon, rising to 70% when livestock rearing is included (Langat et al, 2019). Agriculture encompasses a wide range of productive systems which can be entirely based on crop, animal, forestry or fishery production, or can involve a mixture of these, their associated activities, and natural systems. This leads to a huge variety in the types of agro-ecosystems, such as annual crop monocultures, temperate perennial orchards, tropical shifting cultivation systems, smallholder mixed cropping systems, rice production systems, tropical plantations (e.g., coffee, tea), agroforestry systems, animal-based intense farming system and arid-land pastoral systems (USAID, 2021).

Agricultural activities, while delivering provisioning services (such as food, fibres and biomass), also rely heavily on natural capital assets such as air, water, soil and biodiversity, and exist at the intersection of various socio-political interactions (e.g., the intersection of culture, livelihoods and policy). As such, farmers and other land managers can play a pivotal role in protecting natural capital and supporting the delivery of ecosystem services: they may be both beneficiaries of ecosystem services who are willing to contribute towards the protection or enhancement of vital services such as water supply, flood and erosion control and pollination, or providers of such services to others.

Agricultural activities are recognised as an entry point to PES not only as an important driving factor in ecosystem degradation, but also as a key factor in the restoration of watersheds and other habitats (USAID, 2021). PES can provide positive incentives (additional income or in-kind payments) for alternative land uses or specific practices at the farm level which contribute towards the protection or restoration of natural ecosystem processes that are used and valued by others.

Although PES schemes involving agricultural actors are typically aimed at securing or enhancing water supply or water quality, the potential exists to reward the delivery of a suite of ecosystem services that can be simultaneously provided through appropriate agricultural practices in a packaged PES scheme (bundled, layered or piggy-backed - see Figure 8).

For the purposes of this study, this assessment focuses on the potential for agroforestry (tree-planting and afforestation) practices as part of a potential carbon-based bundled PES scheme. If undertaken with a detailed management plan and use of native/endemic tree species, agroforestry can provide societal benefits through increased carbon sequestration and biodiversity as well as direct benefits to farmers including increased agricultural productivity and food supply due to increased soil fertility from nutrients infused into soil by trees, reduced soil erosion, improved nutrient cycling and increased resilience of food supplies to pests, diseases and climatic extremes (Tamburini et al., 2020; KWTA, 2018; Altieri et al., 2015).

To be successful, any tree-planting on cropland and agroforestry activities supporting a PES would also need to promote or ensure long-term food security without the need for encroaching on indigenous forest areas to achieve long-term sustainable, a condition that will be fulfilled only when at least the subset of ecosystem services that are particularly influenced by agricultural activities are managed under sustainable and ecological criteria (USAID, 2021). Findings from the literature suggest that PES in agricultural systems tend to be more sustainable when they encompass a bundle of ecosystem services, rather than focus on a single service (e.g., water quality).

Supply

This review found limited information about agricultural production in the Mount Elgon study area. Crops in this region are mostly cultivated on a small scale, with most households growing crops for their own consumption as well as for sale at local markets (USAID, 2021). Climate change could be a further driver of agricultural expansion in areas where conditions become more favourable for cultivation (see Table

23).

Table 23: Summary of expected changes in suitable area and suitability scores for crops in the Northern Savannas (including Mount Elgon)

CROP	PRESENT	FUTURE
Beans	High suitability across virtually all of the landscape, with the upper slopes of Mount Elgon the only area not suitable for growth.	Virtually all of the landscape remains suitable, while unsuitable area on Mount Elgon expands upslope. However, suitability scores do decline somewhat over the central and southern regions of the landscape.
Cassava	Most of the landscape suitable, aside from higher-lying areas. However, areas with high suitability generally limited to the western regions of the landscape.	Suitability scores increase, with an eastward expansion of moderate to high suitability conditions. Unsuitable area expands further upslope, thus increasing suitable area in mountainous regions.
Maize	Suitability mostly limited to the western part of the landscape, with isolated suitable areas associated with higher-lying land elsewhere.	Substantial eastward expansion of suitable area, along with a general increase in suitable area and suitability scores in higher-lying areas.
Millet	High suitability across most of the landscape, with only the upper slopes of mountainous regions unsuitable.	Suitable area expands upslope, accompanied by a general increase in suitability throughout the landscape.
Potato	Virtually all of the landscape suitable, except for the upper slopes of Mount Elgon.	Virtually all of the landscape remains suitable, while unsuitable area on Mount Elgon expands upslope. However, a slight decline in suitability scores occurs across much of the landscape.
Sorghum	Virtually all of the landscape suitable, except for the upper slopes of Mount Elgon.	Suitability score increases throughout the landscape, while suitable area expands upslope on Mount Elgon.

Source: USAID, 2021

An increase in the area of cropland would also have implications for the habitat and migratory routes for wildlife in the area. Estimating the future pace and direction of crop and agricultural land expansion within the area is challenging, as this study found conflicting information on landuse and trends from different sources. USAID (2021), based on earlier work by Osaliya et al. (2019), estimated that the area under cultivation would increase from 5.1 percent of the landscape in 2018 to 7.4 percent by 2050 under a 'business as usual' scenario. This is equivalent to an average increase of around 0.07 percent per year. This total increase would result in the conversion of an additional 109,000 ha of habitat, which would also have implications for water flow, water quality, soil erosion, tourism and biodiversity.

Recent work undertaken by the Food and Agricultural Organization of the United Nations (FAO)[40] suggests that there is an annual loss of tree cover in the study area (of around 1.4%), and there are around 55,000 hectares of degraded land within Mount Elgon spread across Bungoma and Trans Nzoia counties. If these resources are not protected / actions are not undertaken to enhance them, future degradation and habitat loss, with associated impacts to local communities and livelihoods could continue.

USAID (2021) identifies the types of agricultural land management practices that may protect and enhance both food production and the delivery of ecosystem services in smallholder farming systems in East Africa, including Kenya. USAID grouped those agronomic practices that are believed to have an impact on ecosystem services directly related to food production into five main categories:

[40] As presented during the inception meeting for their Food Systems, Land Use and Restoration (FOLUR) Impact Programme (IP) developed with support from the Forest and Landscape Restoration Mechanism (FLRM) on 9th and 10th February 2021, more information is available at: http://www.fao.org/in-action/forest-landscape-restoration-mechanism/resources/detail/en/c/1377469/

1. Increasing and diversifying plantings at the farm level (use of crop margins, rotations, farm edges, fallow lands or strips within cultivated areas);
2. Applying soil and water conservation practices at the farm level;
3. Increasing efficiency in the application of external inputs at the farm level;
4. Making greater use of local agrobiodiversity; and
5. Improving the management of uncultivated areas in farming landscapes.

Encroachment of cropland into Mount Elgon's forest ecosystems is an additional practice which impacts upon the ecosystem services. Any agroforestry activities supporting a potential PES would need to carefully monitor and ensure the protection of indigenous forest against cropland encroachment.

This assessment focuses on the potential for tree-planting (afforestation) and agroforestry practices to support a potential bundled PES scheme – aligning to categories 1 and 5 above, and assuming that the soils are suitable to support tree growth.

It appears that that there is therefore a potential to incentivise agricultural activities to conserve and/or enhance indigenous vegetation in the area which could have a range of benefits. However, further data should be collected in Stage 2 to explore this in more depth and establish the location and diversity of species, particularly in relation to specific forest areas and in relation to plant species of interest.

Demand

Langat et al. (2019) used crop data provided by the Ministry of Agriculture with the FAO's pollination value array tool to estimate the quantity and value of crop production in Mount Elgon. Table 24 presents the results from this exercise. As shown, a variety of nuts, pulses, fruits, and vegetables are produced within Mount Elgon providing an estimated economic value of over KES 3.1 billion (USD $29 million) per year.

In addition, USAID (2021) estimates that households in the Northern Savannas (including Mount Elgon) use around 20 kilograms of wild and medicinal plants per year, the value of which could be around KES 2,393.51 per hectare (USD $22.17 per hectare).

Research suggests that cultivation and demand for crops will likely continue to spread through the landscape due to population growth and the encouragement of governments and developmental agencies, as well as from the desire of local people to diversify and increase their incomes (USAID, 2021).

Agroforestry provides a means for farmers to incorporate and increase forest cover on their land. If carefully managed and monitored with a focus on (i) increasing indigenous/native tree species and (ii) protecting against cropland encroachment on forest ecosystems, these agroforestry practices can deliver wider ecosystem services supported by additional forest cover. De Groot et al. (2020) provides mean standardised values from over 450 valuation studies per service for each biome per hectare per year for all beneficiaries. These estimates reflect the underlying ecological and socio-economic contexts of diverse (but not necessarily representative) study sites. In the absence of more localised evidence, these mean values were used to provide indicative estimates for the wider ecosystem service value areas of increased tree cover could provide. In reality the values provided by different habitats will be heavily influenced by the local context, species used, and management practices for each ecosystem service and habitat type and these estimates should be revised in Stage 2.

Table 24: Estimated value of crop production in Mount Elgon

Crop	Crop Category	Pollination Dependency Ratio Mean (D)	Dependence Upon Animal Pollination	Producer Price Per Metric Ton (KES)	Total Economic Value of Crop (KES)	Economic Value of Insect Pollinators (KES)	Consumer Surplus Loss CSL With Elasticity (KES)	
							- 0.8	- 1.2
Beans (dry)	Pulse	0.05	Little	44,444	1,312,431,320	65,621,566	67,665,411	66,974,803
Macadamia Nuts	Tree Nuts	0.95	Essential	33,892	6,575,048	62,46,296	26,976,245	14,817,519
Avocados	Fruits	0.65	Great	28,811	107,551,463	69,908,451	125,638,485	101,844,200
Green Grams	Pulse	0.05	Little	66,666	33,719,663	1,685,983	1,738,494	1,720,751
Ground-nuts	Oil Crops	0.05	Little	86,363	25,217,996	1,260,900	1,300,172	1,286,902
Soybean	Oil Crops	0.25	Modest	50,000	17,250,000	4,312,500	5,108,056	4,822,452
Bambara Nuts	Vegetables	0.05	Little	80,000	240,000	12,000	12,374	12,248
Sunflower Seeds	Oil Crops	0.25	Modest	30,000	76,530,000	19,132,500	22,662,003	21,394,914
Coffee	Stimulant Crops	0.25	Modest	86,000	1,213,460,000	303,365,000	359,328,811	339,237,843
Mangoes	Fruits	0.65	Great	20,234	58,739,302	38,180,546	68,617,541	55,622,276
Oranges	Fruits	0.05	Little	40,000	4000,000	200,000	206,229	204,124
Lemons	Fruits	0.05	Little	42,857	899,997	50,000	46,401	45,928
Papaya	Fruits	0.05	Little	46,433	33,060,296	1,653,015	1,704,499	1,687,103
Water-melon	Vegetables	0.95	Essential	33,892	6,575,048	6,246,296	26,976,245	14,817,519
Tomatoes	Vegetables	0.05	Little	24463	211,433,709	10,571,685	10900950	10789693
Pumpkins	Vegetables	0.95	Essential	38,468	27,119,940	25,763,943	111,268,260	61,117,460
Cowpeas	Vegetables	0.05	Little	26,563	16,575,312	828,766	854,578	845,856
Total					**3,151,379,094**	**548,793,151**		

Source: Langat et al., 2019

Feasibility

To assess the feasibility of tree-planting and agroforestry to support a bundled PES scheme, we have to assess whether the value of the additional forest cover justifies the potential costs of the intervention. This study found that few evaluations of agroforestry programs include cost-effectiveness assessments, and in general information on costs was limited. In any case, a high-level cost-benefit analysis was conducted using the parameters in Table 25.

Table 25: Parameters used to assess agroforestry PES feasibility at Mount Elgon

Parameter	Value	Explanation
Discount rate	7%	Based on the social discount rate for projects in Kenya as in Warusawitharana (2014) and used in Langat et al. (2019). This could be revised based on the rates of specific indigenous tree species assemblages and life histories to determine realistic time frames for return on investment and adjust the cost benefit analyses accordingly alongside sensitivity testing in Stage 2.
Portion of one hectare cropland converted to tree cover	0.196 ha (10.9% of average holdings of 1.8 ha)	Based on Mount Elgon farmer responses from Sumkowo et al. (2011)
Opportunity costs	KES 6,371 – KES 21,505 (USD $59 – USD	Taken from Atisa et al. (2014) and converted to KES and USD 2020. Represents the estimated opportunity costs per year (including implementation costs) associated with the area

Parameter	Value	Explanation
	$199)	converted to tree cover in the row above.
Ecosystem service benefits	KES 38,514 – KES 86,260 (USD $357 – USD $799)	Estimated using ecosystem service values per hectare per year for relevant forest cover from the Ecosystem Service Valuation Database (ESVD) (De Groot et al., 2020).
Assessment period	20 years	In line with timelines for assessment used for CDM projects (see section on Global climate regulation) and KFS's Plantation Establishment and Livelihood Improvement Scheme (PELIS) program. This could be revised based on the rates of specific indigenous tree species assemblages and life histories to determine realistic time frames for return on investment and adjust the cost benefit analyses accordingly alongside sensitivity testing in Stage 2.

Source: Various - Refer to specific row

An overview of the initial feasibility assessment is set out in Table 26. The findings of this assessment should be ground-truthed and revised as necessary in Stage 2.

Table 26: Overview of feasibility of tree-planting and agroforestry activities to support PES

Potential NPV of ecosystem services (KES/ha & USD/ha)	PV of opportunity cost (KES/ha & USD/ha)	Does the NPV exceed the opportunity cost?
KES 408,016 – KES 913,838 USD $3,779 – USD $8,464	KES 68,432 – KES 227,823 USD $634 – USD $68,432	✓ Agroforestry / tree-planting on 0.19 hectare per hectare of cropland

Source: AECOM

There are a number of initiatives in the area focused on or directly related to Sustainable Agricultural Land Management (SALM) practices. These include the Kenya Agriculture Carbon Project (KACP) and KFS's PELIS program. KWTA also has an implementation plan and budget of KES 475 million for conservation within the water tower, and any potential PES should work to complement this. The majority of farmers in the area are subsistence farmers, who would support a potential bundled PES acting as the 'sellers' of tree-planting and agroforestry carbon benefits in an associated scheme. As environmental markets develop over time, there may be potential for additional and/or different ecosystem services arising from tree-planting and agroforestry (such as biodiversity or forest-dependent crops) to be sold. The 'buyers' of these additional services and their benefits may be the Government in lieu of the Kenyan population, or potentially conservation groups in the area who would pay for the conservation benefits associated with increased forest cover. Alternatively, agroforestry activities could be linked to an agricultural PES scheme, where one or more (or a mixture of additional) buyers could make payments to secure and enhance agroforestry services.

Appendix B. Legal analysis

In addition to the findings reported in Section 5 Legal analysis, this appendix provides further detail on the legal and regulatory framework and considerations for a potential PES scheme on Mount Elgon.

Laws and policies that implicitly support pes without direct mention of the term

- Constitution of Kenya, 2010: the Constitution encourages environmental conservation, and its provisions enable PES schemes although the Constitution makes no direct mention of PES. These provisions include Article 10 (2) (d) of the Constitution, which set out sustainable development as a national value and governing principle, and Article 69 (1) (a), under which the State is mandated to ensure sustainable exploitation, utilisation, management, and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits. Under Article 69 (2), every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources. Article 42 further guarantees every person the right to a clean and healthy environment which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures.
- Environmental Management and Coordination Act (EMCA) No 8 of 1999: EMCA is Kenya's principal law for the management and coordination of the environment and supports PES in various ways, though it does not explicitly make mention of the term 'PES':
    - Under Section 3, it guarantees every person in Kenya a clean and healthy environment.
    - Under Section 57 it sets out the tax and fiscal incentives, disincentives, and fees that may be imposed by the Cabinet Secretary to induce or promote the proper management of the environment and natural resources or the prevention or abatement of environmental degradation. These include user fees to ensure that those who use environmental resources pay proper value for the utilisation of such resources.
    - Under sections 112–116 it provides for the creation of environmental easements to facilitate the conservation and enhancement of environmental conditions for various purposes including environmental services. Section 112 (5A) highlights that the principle of voluntary engagement shall be used to encourage landowners to grant an easement on their land and to encourage environmental conservation as a competitive land use option. Section 116 makes provision for compensation for environmental easements, which shall be commensurate with the lost value of the use of land.
- Environmental Management and Coordination (Water Quality) Regulations, 2006: though these regulations do not mention PES specifically, they support PES schemes by providing guidelines on the use and management of water sources and quality of water for domestic use, municipal supply, and irrigation. The regulations prohibit anyone from undertaking development activities in areas where such development may pollute or interfere with water.
- Environmental Management and Coordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009: these regulations do not mention PES specifically but support PES schemes by providing that wetland resources shall be utilised in a sustainable manner compatible with the continued presence of wetlands and their, inter alia, ecological functions and services. It further places a duty on every owner, occupier or user of land which is adjacent or contiguous to a wetland to prevent the degradation or destruction of the wetland and maintain the ecological and other functions of the wetland.
- Land Act, 2012: the Land Act makes provision for the registration of land under different land tenure regimes. The Act provides ownership rights to various entities who are vested with

powers over the land and may negotiate different management structures. The Act thus provides clarity on tenure rights, which are key ingredients in formulation and implementation of PES schemes, though it does not mention PES explicitly.

- Water Act, 2016: the Act does not mention PES specifically but supports PES by providing for the regulation, management, and development of water resources in line with the Constitution:
    - The Act under Section 22 provides that the Water Resources Authority (WRA) may order by Gazette, the designation of a catchment area to be a protected area and may impose requirements or regulate or prohibit conduct or activities for the protection of the area and its water resources.
    - The Act and the subsidiary legislation currently in force set out the regulation of water rights, making provision for the requirement of permits and the imposition of water use charges for abstraction. The Act gives powers to WRA to levy water use to support catchment conservation activities. Section 132 of the Act is explicit that all income through water permits, abstraction, and water user fees shall be entirely used for the conservation and management of water resources.
- Water Resources Regulations, 2021: replace the Water Resources Management Rules, 2006. The regulations have been recently gazetted and they seek to align the water sector to the devolved governance system introduced by the Constitution of Kenya, 2010. These regulations allow a Water Resource Users Association (WRUA) to enter into a tripartite Memorandum of Understanding (MoU) with the Water Resource Authority (WRA) and the respective county government for purposes of collaborative management of a water resource and for water resource conflict resolution at sub-basin level. The regulations also provide that the WRA, shall equitably allocate financing to WRUAs for conservation and management of water resources.

Relevant legal disputes on Mount Elgon

Court Case 1[41]

In this case the Petitioner, on behalf of the Cheptais Community Forest Association and Chebombai area residents, alleged that despite a court order not to evict them, the Respondents,[42] being the KFS and others, had done so.

According to the Petitioner, on diverse dates in the month of June 2020, the Respondent evicted around 200 families from Chebombai area in Cheptais Location within Mount Elgon region. As such, the Petitioner sought for the Respondents to be cited for contempt of court, for disregarding the order not to evict.

The Respondents on their part claimed that the Cheptais community had encroached Mt. Elgon, a government forest, hence the evictions. They further asserted that by the time the Court order not to evict the community was issued on 7th October 2020, they had already completed evictions of all community members, in an operation that lasted from 19th June to 22nd June 2020. The order not to evict had therefore already been overtaken by events when it was issued.

[41] *Richard K. Sibilibili v Kenya Forest Service & 9 others* [2021] eKLR. Available at: http://kenyalaw.org/caselaw/cases/view/206576/ ion 3 of 2020 - Kenya Law

[42] Kenya Forest Service, Cabinet Secretary Ministry of Interior, Cabinet Secretary Ministry of Environment and Forestry, Regional Commander of Kenya Forest Service – Western Region, Eco System Conservator Bungoma County, County Commissioner Bungoma County, County Base Commander Mountt Elgon Forest, Deputy County Commissioner Cheptais Sub – County, Forest Manager Cheptais Forest Station & Attorney General.

In its ruling, the Court dismissed the Petitioner's case, finding that the Respondents could not be cited for contempt of court as by the time the order not to evict was given, the evictions had already been completed. Further, the Petitioner had not served the Respondent's with the Court order not to evict, and they could not therefore be held in contempt of an order that was not served on them.

The ruling in the above case was delivered on 28th January 2021, and as is evident, the case did not determine the legality of the evictions or assert the right of the community to stay in the forest.

Court Case 2[43]

In this case, the Petitioner's sought an order of the Court to certify the matter as one raising substantial questions of law under Article 165(4) of the Constitution, in order for the Chief Justice to constitute an enlarged bench to hear and determine it.

One of the grounds of the Petition was that, it was a violation of the Petitioner's human rights for the FCMA to delineate as gazetted public forest, what they, as the Ogiek of Chepkitale, deemed as their community land.[44] In essence the Petitioner was challenging the categorization of the Mountt Elgon forest land as public forest.

The Court ruled that the matter was one raising substantial questions of law and referred the Petition to the Chief Justice to constitute an enlarged bench of uneven number of Judges being not less than three (3), to hear and determine it. There is no further information about the court case in the public domain, however once the matter is finally heard and determined, it is likely to be a watershed moment, settling the thorny question of who the rightful owner of the forest is.

[43] *Peter Kitelo Chongeiywo & 10 others (suing as representatives of the Ndorobo/Ogiek Community of Chepkitale, Mt. Elgon) v Attorney General & 4 others; Kenya National Commission on Human Rights (Amicus Curiae)* [2020] eKLR. Available at http://kenyalaw.org/caselaw/cases/view/195705/.

[44] Forest Conservation and Management Act, 2016, Third Schedule.

About AECOM

AECOM is the world's trusted infrastructure consulting firm, delivering professional services throughout the project lifecycle – from planning, design and engineering to program and construction management. On projects spanning transportation, buildings, water, new energy and the environment, our public- and private-sector clients trust us to solve their most complex challenges. Our teams are driven by a common purpose to deliver a better world through our unrivaled technical expertise and innovation, a culture of equity, diversity and inclusion, and a commitment to environmental, social and governance priorities. AECOM is a Fortune 500 firm and its Professional Services business had revenue of $13.2 billion in fiscal year 2020. See how we are delivering sustainable legacies for generations to come at aecom. com and @AECOM.