Design and Implementation of a Payment for Ecosystem Services Scheme in the Chyulu Hills: *PES Scheme Principles*

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GNI plus

THE GLOBAL NDC IMPLEMENTATION PARTNERS

Authors

Prepared by: Chris White (AECOM), Michael Aquilina (AECOM), Cary Shepherd (Pollination), Ricardo Narvaez (CPI)

Checked by: Emily Le Cornu (AECOM), Marisa Martin (Pollination), Elvis Wakaba (CPI)

Reviewed by: Renard Teipelke (AECOM), Steve Smith (AECOM), Chris Tuite (Maasai Wilderness Conservation Trust)

Approved by: Renard Teipelke (AECOM)

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GNI^{plus}

This document has been delivered under the Global NDC Implementation Partners (GNI^{plus}) project being undertaken 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 (CPI), AECOM, and Pollination. It provides governments with the best available policy, technical, financial, governance, and legal expertise to support the implementation of their Nationally Determined Contributions (NDCs). GNI^{plus} also supports governments as they work to mobilise private investment and create long-term, sustainable growth and development.

About the authors

This document has been prepared by AECOM, CPI, and Pollination under Output III of the GNI^{plus} project in Kenya.

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CPI is an analysis and advisory organisation with deep expertise in finance and policy. Our mission is to help governments, businesses, and financial institutions drive economic growth while addressing climate change. Our vision is to build a sustainable, resilient, and inclusive global economy. CPI led the financial analysis in this report.

Pollination is a global advisory and investment firm that brings together world leaders in finance, technology, corporate strategy, law, and policy to deliver sustainable solutions and accelerate the transition to a net zero, climate resilient future. In particular, we work with governments and policy makers to develop law and governance systems that unlock billions in funding for climate mitigation and adaptation to enable transformative investments. We are relentless in our focus on developing ideas and innovations that are transformative and scalable, particularly in critical areas that require investment – including nature-based solutions, carbon markets, and adaptation initiatives. Pollination led the legal analysis in this report.

Front cover photo credit: Emily Le Cornu

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Acronyms

Acronym	Definition
CCB	Climate, Community, and Biodiversity standard
CFA	Community Forest Association
CHCT	Chyulu Hills Conservation Trust
CPI	Climate Policy Initiative
CWA	Community Wildlife Association
CWSB	Coast Water Services Board
FCMA	Forest Conservation and Management Act
KFS	Kenya Forest Service
KWS	Kenya Wildlife Service
MoU	Memorandum of Understanding
MOWASCO	Mombasa Water Supply & Sanitation Company
MWCT	Maasai Wilderness Conservation Trust
MWF	Mombasa Water Fund
NDC	Nationally Determined Contribution
NGO	Non-Governmental Organisation
PES	Payments for Ecosystem Services
REDD+	Reducing Emissions from Deforestation and forest Degradation, plus the sustainable management of forests, and the conservation and enhancement of forest carbon stocks
tCO_2e	tonnes of Carbon Dioxide equivalent
USD	United States Dollars
VCS	Verified Carbon Standard
WASREB	Water Services Regulatory Board
WCMA	Wildlife Conservation and Management Act
WRA	Water Resources Authority
WRUA	Water Resource User Association

Design and Implementation of a Payment for Ecosystem Services Scheme in the Chyulu Hills: PES Scheme Principles

Executive Summary

Executive Summary

What is the purpose of this project?

The Chyulu Hills are located in the south east of Kenya, on the edges of the world famous Tsavo West and Amboseli National Parks. The biodiversity rich cloud forests of the Chyulu Hills are recognised as one of Kenya's Water Towers (areas of forest in mountainous areas that provide important watershed services), and play a role in regulating freshwater for the catchment. Despite their importance, they are facing a growing number of threats and pressures.

The water captured by these cloud forests infiltrates into an underground aquifer storing up to 600 million cubic metres of water.[1] This water flows downwards to form a number of springs, the most significant of which is the Mzima Springs located around 30 kilometres to the south in Tsavo West National Park. A pipeline from these Springs provides a key water source for Mombasa – Kenya's second largest city. In order to help meet the city's growing demand for water, a second pipeline is planned at the Springs to be completed by 2030. This will take the total water supply capacity up from 35,000 m^3/day to 105,000 m^3/day.

The impact of forests on maintaining water supplies at the Mzima Springs is complex. The cloud forests within the Chyulu Hills play an important role in regulating water quantity within the area through generating fog and increasing infiltration rates. However, not all areas of forest provide a positive impact on water quantity, and not all changes in cloud forest cover within the Chyulu Hills necessarily lead to changes in the flows at the Mzima Springs given the complexity of the hydrological system. While this relationship is complex, the reliance of Mombasa on the Springs means that the impacts of any change in water flows would be highly significant. As such, protecting the Chyulu Hills ecosystem as it currently functions is of critical importance in reducing the risk of the collapse of the hydrological system leading to significant and permanent changes in the water supply at the Mzima Springs.

The forests of the Chyulu Hills are currently included in the project area of a REDD+ scheme which is scheduled to operate from 2013 to 2043. However, low carbon credit prices and uncertainties in the voluntary carbon market, together with declining income from ecotourism, unpredictable and short-term philanthropic support, climate change pressures, and growth in the demand for land and resources in the region mean that the scheme is unlikely to be able to fully fund all of the needed forest and biodiversity protection and community support to guarantee ecosystem service provision.

The aim of this project is for GNIplus to work with the Chyulu Hills Conservation Trust (CHCT), a consortium of nine local stakeholder organisations[2] and the Maasai Wilderness Conservation Trust (MWCT) who act as 'Project Office' for the REDD+ project (hereafter referred to as CHCT), to help design and implement a PES scheme in the Chyulu Hills which would serve to maintain downstream water supplies through the preservation of the forests that help to regulate this water.

What is the purpose of this document?

Following publication of a baseline report which developed an outline proposal for the design of the Chyulu Hills PES scheme,[3] several stakeholders were engaged to discuss the findings of the project, including members of CHCT (representing the ecosystem service sellers in the area), and The Nature

[1] Tuite, C. (2019), 'Chyulu Hills Blue+ Water Project'.
[2] Kenya Wildlife Service (KWS), Kenya Forest Service (KFS), Maasai Wilderness Conservation Trust (MWCT), Big Life Foundation, Sheldrick Wildlife Trust, and Group Ranches Rombo, Kuku, Kuku A, and Mbirkani.
[3] AECOM, Pollination, Kieti Advocates & AmbioTEK (2021), 'Design and Implementation of a Water Payment for Ecosystem Services Scheme in the Chyulu Hills: Baseline Report'.

Conservancy (leading the developing of a Mombasa Water Fund).

On the basis of the feedback received, additional work was carried out to refine and enhance the ideas for the Chyulu Hills PES scheme set out in the baseline report, in order to provide a clearer, and more practicable set of principles for establishing the scheme in practice. In particular, the baseline report, and the feedback received on the report, identified a number of challenges that need to be addressed by the proposed Chyulu Hills PES scheme:

- Developing the evidence base around the role of forests in protecting water supplies.
- Establishing the financial case for the scheme.
- Clarifying the legal basis of the scheme.
- Integrating with other schemes in the area, particularly the proposed Mombasa Water Fund.

This document sets out a revised set of principles for the Chyulu Hills PES scheme which address these challenges.

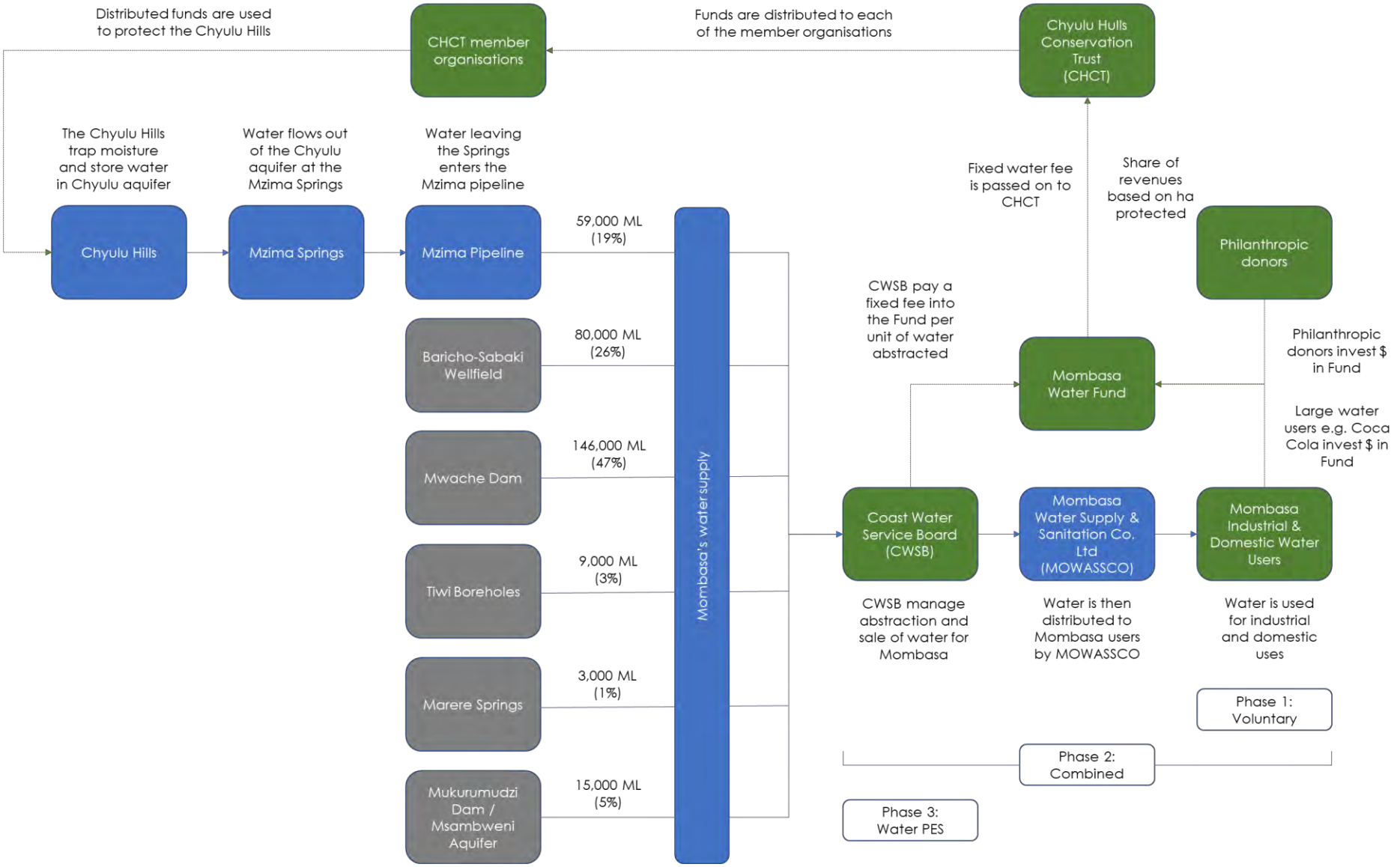
What are the key principles of the Chyulu Hills PES scheme?

The proposed principles for the Chyulu Hills PES scheme are as follows:

- The Chyulu Hills PES scheme would sit alongside the existing REDD+ scheme.
- In the short term, the scheme would focus on securing voluntary payments for the range of non-carbon ecosystem services provided by the Chyulu Hills' forests (e.g. water supply, water quality regulation, hazard regulation, disease and pest control, tourism, and biodiversity).
- The target buyers would be large, industrial water users in Mombasa as well as other ecosystem service beneficiaries such as international donors, tourism organisations, and NGOs with an interest in protecting the area.
- The PES scheme would be integrated within the broader Mombasa Water Fund such that all funds would be raised through the central Mombasa Water Fund mechanism. These funds would then be passed on to CHCT to manage the REDD+ Project area and prevent deforestation through the existing governance arrangement. While these funds would be voluntary, there would be a target of raising around $24 for each ha of forest protected under the scheme. It is estimated that the annual benefits of such protection would amount to around $638 per ha.
- Over the longer term there would be a shift towards establishing a more market-focused PES scheme whereby buyers pay a unit fee for the water supplied from the Mzima Springs. The imposition of this fee would be supported by a range of factors including: developing the evidence base around the links between forest cover and water supplies; increasing economic growth in Mombasa making the proposed fee more financially acceptable; growing experience of the benefits provided by the PES scheme; building up of trust though the Mombasa Water Fund mechanism; and bringing on line the second pipeline at the Mzima Springs to enable a reduction in the fee per unit of water abstracted. The aim would be to transition from a voluntary to a fully market-based scheme with water users paying around $0.10 per m^3 in 2031 when the second pipeline comes on line. The fees would be paid into the Mombasa Water Fund and passed on to CHCT to be disbursed through the existing REDD+ mechanism.

A diagrammatic overview of the revised PES scheme is set out in Figure 1 overleaf.

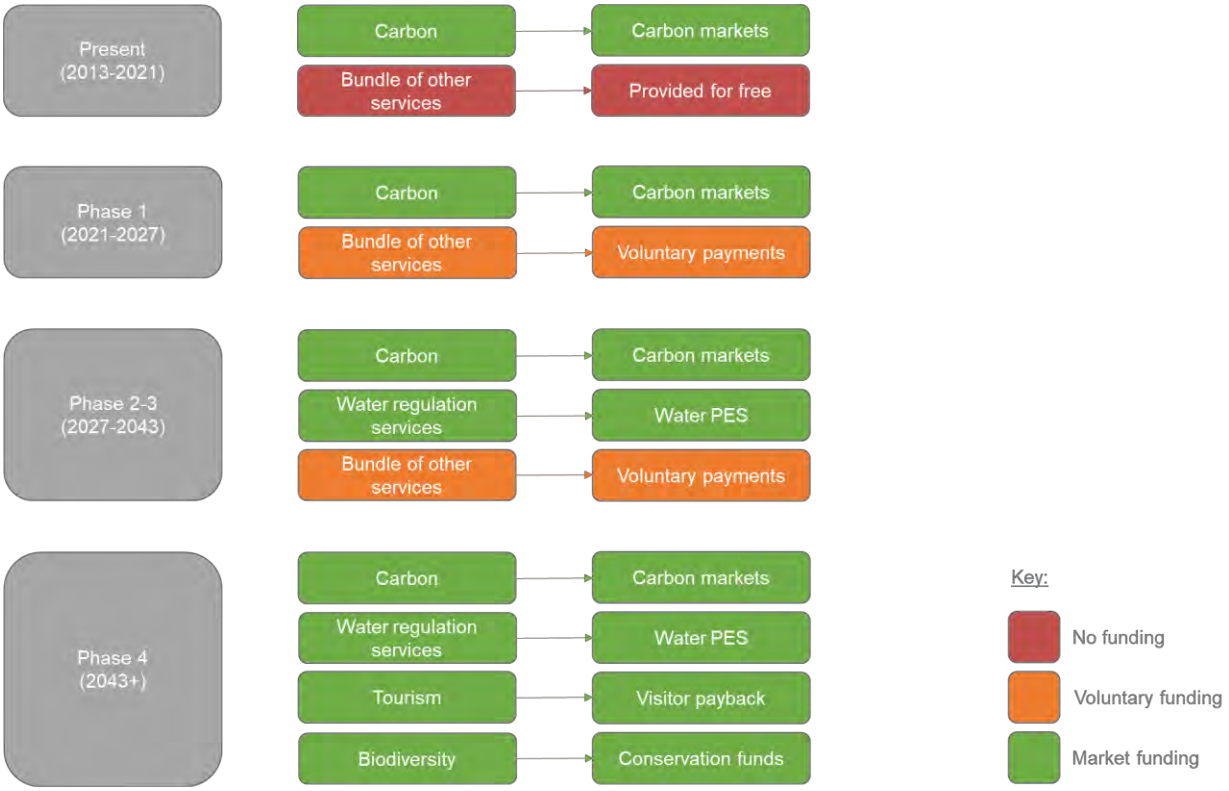
Figure 1. Overview of the proposed Chyulu Hills PES scheme structure



Source: AECOM, 2021

Over the longer term, particularly in the 2040s when the REDD+ scheme is no longer operational, a fourth phase of the scheme could be launched. This phase could further develop the model of transitioning from paying for a bundle of services towards individually layered schemes for specific ecosystem services (i.e. carbon and water regulation), to explore the potential for setting up separate financial arrangements for the other ecosystem services provided by the Chyulu Hills region such as biodiversity (see Figure 2).

Figure 2. Opportunity to transition to a multi-layered PES scheme in the Chyulu Hills



Source: AECOM, 2021

The opportunity with this approach is that it allows for a broad, flexible approach to securing funding in the early stages of the scheme, when data on the impacts of forest cover on ecosystem service provision are limited and financial constraints are high. This voluntary approach is simpler and easier to set up than a fully-functioning water market and allows the scheme to target a broad range of potential buyers that may be interested in investing, although in the long term it may struggle in terms of sustaining the required level of financing given that it relies on voluntary donations.

As further data is collected, users are familiarised with the concept of PES, the amount of water being abstracted from Mzima Springs increases, and a solid business case can be developed to clearly identify the benefits to water users of protecting the Chyulu Hills, the approach allows for a transition away from a system of voluntary donations towards a fully functioning market whereby water users pay for the benefits provided by protecting the Chyulu Hills ecosystem. The development of such a market is complex and will require solid data and trust built up between all sides, however, it offers the opportunity to secure a long-term approach to the financing problem facing the Chyulu Hills, as the users of the services are paying to protect the long term provision of those services, ultimately out of their own financial interest.

In the short term there are no legal impediments to setting up a voluntary PES scheme for the different ecosystem services provided by the Chyulu Hills. The mechanism already in place for the flow of payments for carbon credits from the REDD+ project may be used to channel finance flows for the PES scheme. Although it is important to exclude carbon from the PES scheme to avoid double counting with the REDD+ Project.

Over the longer term, there is a need for CHCT (or The Nature Conservancy or the Mombasa Water Fund's organisational body) to be designated as a revenue collector by the Water Resources Authority to allow the collection of a unit water fee. As the scheme grows it could also be worth exploring the possibility of extending the make-up of the CHCT partnership to include representatives from any relevant organisations such as Community Forest Associations.

What are the possible next steps?

Based on the findings of this report, several potential next steps are outlined below (which could be pursued independently or in combination):

- Building on previous stakeholder engagement, the findings of this work could be presented to key stakeholders within the Chyulu Hills and Mombasa to garner further feedback and support for the project.
- Further conversations could be held with The Nature Conservancy to explore how the Chyulu Hills PES scheme could be integrated into the Mombasa Water Fund and pitched to investors at the launch of the fund.
- Additional work could be undertaken, as part of the development of the Mombasa Water Fund, to engage with potential buyers about the scheme and develop materials needed to support this.
- A monitoring plan could be set up whereby part of the funds raised through the PES scheme are allocated to gather data on the performance of the scheme in each year of its operation, as well as being used to develop a more detailed understanding of the hydrological system and the need for continuing payments. This could build on the baseline digital natural capital accounting platform developed for the Chyulu Hills as part of this project. This platform can be accessed at the following link: https://planengageuk.alytics.com/unpublished/chyulu-hills-dnca/home.

Design and Implementation of a Payment for Ecosystem Services Scheme in the Chyulu Hills: PES Scheme Principles

Main Report

1. Chapter 1: Introduction

1.1 Overview

Located between the Tsavo West and Amboseli National Parks, the Chyulu Hills forms one of Kenya's critically important 'Water Towers'. This term is used in the Kenyan context to refer to *"elevated geographical areas comprising mountains, hills, and plateaus where the topography, geology, soils, and vegetation support 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 is harnessed for use"*.[4]

In the Chyulu Hills, the steep slopes create a natural barrier which forces the prevailing wind upwards, leading to precipitation as the water vapor cools and condenses. In addition to the topography of the hills, the cloud forests at the highest elevations create optimal conditions for promoting cloud formation and interception, while fog deposition on vegetated areas provides an additional source of moisture[5]. This water infiltrates into the soil and flows underground to ultimately feed a number of rivers and springs in the surrounding plains and coastal region.

Over the last forty years, many of the Water Towers in Kenya have been severely degraded, despite the critical role they play in sustaining a healthy population and supporting the country's key economic sectors, including agriculture, tourism, and energy.[6] The degradation of Water Towers in Kenya has been found to lead to a wide range of issues including: siltation of dams; deterioration of water quality; increased water use conflicts due to competition between users; the drying up of rivers and increased fluctuation of water levels in lakes; food shortages; intermittent shortages of electricity; and wider environmental degradation.[7]

Alongside a range of pressures such as population growth, agricultural expansion, illegal logging, and climate change, inadequate public financing for watershed services has impeded efforts to reverse the degradation of Water Towers in Kenya[8]. This has arguably been compounded by a lack of awareness among landowners of the impacts of their land management decisions and the potential benefits they could derive from providing watershed services.

Payments for Ecosystem Services (PES) offer an innovative means of generating funds to incentivise efforts to protect and restore the natural environment. PES schemes aim to establish arrangements under which the providers of ecosystem services are compensated (in cash or in kind) by the beneficiaries of those ecosystem services. For example, farmers might receive payments from urban water consumers or hydropower operators for adopting practices that can be linked to improvements in water flows or sedimentation downstream.

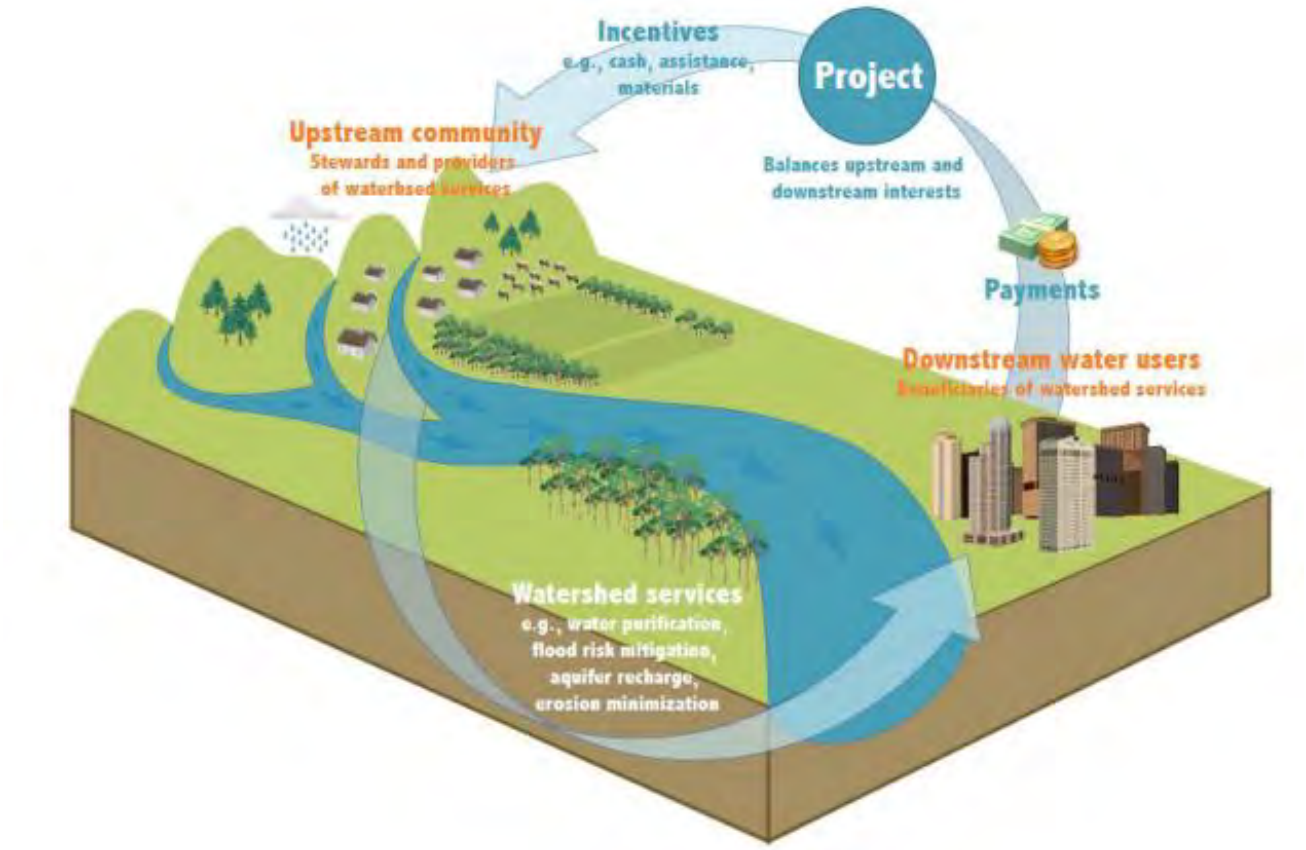
The services that are most often secured through PES schemes include:

- 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).[9]

[4] KWTA (2020), 'Kenya Water Towers Status Report for Chyulu Hills – Revised'.
[5] MWCT (2019), 'The Great Chyulu Hills Reservoir'.
[6] Republic of Kenya, (2019) Water Towers conservation and coordination policy.
[7] Wildlife Works Carbon (2015) The Chyulu Hills REDD+ Project. VCS Version 3, CCB Standards Second Edition.
[8] USAID (2020) Promoting Self-Reliance and Community Engagement for Water Towers.
[9] For further information see: http://www.fao.org/redd/en/

- Biodiversity: this includes land use practices that promote the conservation of biological diversity and ecotourism opportunities that promote wildlife conservation.
- Water resources management: this includes land use practices that promote the conservation of watershed functions, particularly in terms of water quality and water supply.

Figure 1.1 The PES concept



Source: Bennett, Carroll & Hamilton (2013), 'Charting New Waters: State of Watershed Payments 2012'

One 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 long term, viable model.

1.2 PES project aims and objectives

The forests of the Chyulu Hills are currently included within the project area of a REDD+ scheme which is scheduled to operate from 2013 to 2043. The scheme is certified under the Verified Carbon Standard (VCS) and the Climate, Community, and Biodiversity standard (CCB). The objectives of the scheme are to prevent the emission of 20 million tonnes of CO_2e into the atmosphere by stopping deforestation, forest degradation, and grassland conversion (to arable/pasture) in the Chyulu Hills.[10]

[10] Note, the Baseline Report reported a figure of 38 million tonnes of CO2e. This figure was based on an outdated calculation. The revised estimate is closer to 20 million tonnes although may change again following future verification processes.

However, low global carbon credit prices and uncertainties in the voluntary carbon market, together with declining income from ecotourism, unpredictable and often short-term philanthropic support, climate change pressures, and growth in the demand for land and resources in the region, mean that the scheme is unlikely to be able to fully fund all of the needed forest and biodiversity protection and community support to guarantee ecosystem service provision.

The aim of this project is for GNI^{plus} to work with the Chyulu Hills Conservation Trust (CHCT), a consortium of nine local stakeholder organisations[11] and the Maasai Wilderness Conservation Trust (MWCT) who act as 'Project Office' for the REDD+ Project (hereafter referred to as CHCT), to help design and implement a PES scheme in the Chyulu Hills which would serve to maintain downstream water supplies and other ecosystem services through the preservation of the forests that help to provide them.

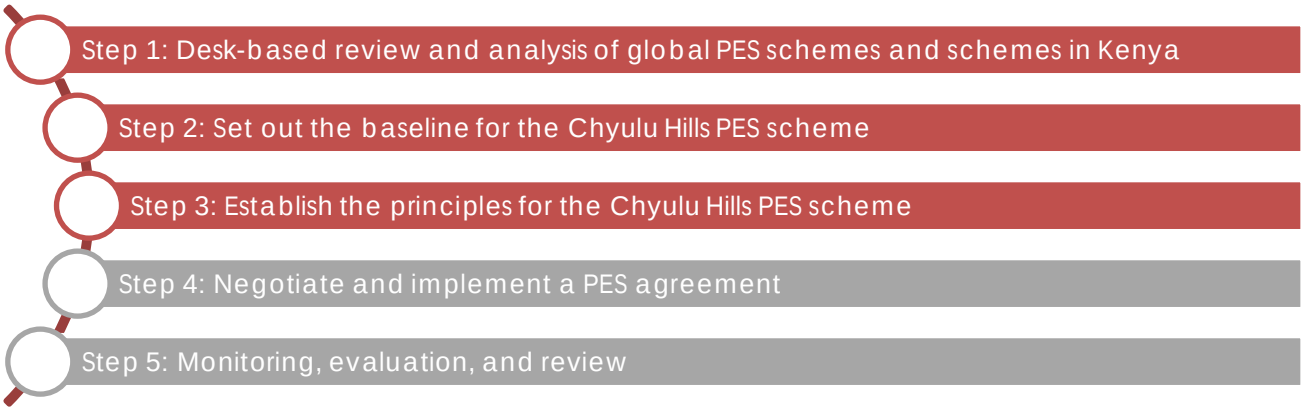
The aim is that the scheme will work alongside the existing REDD+ scheme, developing a broader portfolio of ecosystem service payments that increases overall revenue for conservation and the delivery of economic and social benefits for local communities. Broader and more diverse sources of revenue would also provide greater stability and predictability of revenue flows in the event that external factors adversely impact the ecotourism or carbon markets, or philanthropic support. The specific objectives of this project are to:

- Review water-based PES schemes around the world to identify good practice and lessons learnt that are relevant to, or have the potential to be applied in, the Kenyan context – with a specific focus on water supply and water quality, and how 'layered' PES schemes (covering multiple ecosystem services) have worked.
- Review lessons learned from the PES schemes that have been established to date in Kenya.
- Analyse the current extent and condition of the Chyulu Hills sub-catchments; the quantity and value of ecosystem services they provide; the key drivers of catchment degradation and trends in relation to these; and the question of who benefits from these services, and to what extent.
- Review the existing policy, legal, and regulatory framework relevant to the establishment of a Chyulu Hills PES scheme.
- Identify the specific land management actions that could maintain, enhance, or provide services and who would need to undertake those actions.
- Identify the local communities, landowners, managers, and public institutions that would need to be involved in establishing the scheme and generating the required ecosystem services.
- Identify potential public and private sources of funding, such as water tariffs, for implementing the activities identified.
- Identify suitable policy, legal, contractual, and institutional arrangements for the governance, administration, and implementation of a PES scheme.
- Support the scaling up and replicating of PES schemes in Kenya and elsewhere.

The key steps involved in the design and implementation of the Chyulu Hills PES scheme are set out in Figure 1.2.

[11] Kenya Wildlife Service (KWS), Kenya Forest Service (KFS), Maasai Wilderness Conservation Trust (MWCT), Big Life Foundation, Sheldrick Wildlife Trust, and Group Ranches Rombo, Kuku, Kuku A, and Mbirkani.

Figure 1.2 Steps to design and implement a PES scheme in the Chyulu Hills (red highlights indicate completed steps; grey highlights indicate steps still to be completed)



Source: AECOM, 2021

1.3 Aim and structure of this document

Following completion of the first two steps set out in the figure above, and publication of the literature review[12] and baseline report[13], several stakeholders were engaged to discuss the findings of the project including members of the Chyulu Hills Conservation Trust (representing the ecosystem service sellers in the area), and The Nature Conservancy (leading the developing of a Mombasa Water Fund). Engagement was held through review of the documents and online conference calls. In-country visits were planned to discuss the findings with a wider range of stakeholders although these were not possible due to COVID-19 restrictions.

On the basis of the feedback received, additional work was carried out to refine and enhance the ideas for the Chyulu Hills PES scheme set out in the baseline report, in order to provide a clearer, and more practicable set of principles for establishing the scheme in practice. This document sets out these principles.

This document consists of the following chapters:

- Chapter 1: Introduction to the project and aims of establishing a PES scheme in the Chyulu Hills.
- Chapter 2: Overview of the Chyulu Hills PES scheme and the key findings from the baseline report, including the key challenges identified in relation to the proposed scheme.
- Chapter 3: Financial analysis exploring the current funding gap and methods for addressing this gap through a revised scheme structure.
- Chapter 4: Legal analysis covering the policy, legal, and regulatory considerations for the revised structure of the Chyulu Hills PES scheme.
- Chapter 5: PES principles setting out the key considerations with respect to what a revised Chyulu Hills PES scheme could look like, and how this differs from the original concept set out in the baseline report.

[12] AECOM (2020), 'Design and Implementation of a Pilot Water Payment for Ecosystem Services Scheme in the Chyulu Hills: Literature Review'.
[13] AECOM, Pollination, Kieti Advocates & AmbioTEK (2021), 'Design and Implementation of a Water Payment for Ecosystem Services Scheme in the Chyulu Hills: Baseline Report'.

- Chapter 6: Conclusions and recommendations from the analysis undertaken in this report.
- Appendix A. Summary of laws and policies relevant to PES in Kenya

Alongside the report, a digital PES toolkit has been developed in order to reflect the findings of this project, and other PES schemes in Kenya, to provide guidance and resources to support other organisations to set up PES schemes. The toolkit can be accessed here: https://planengageuk.alytics.com/unpublished/aecom-pes-toolkit/home.

A digital natural capital account has also been developed for the Chyulu Hills area to provide a structured, quantitative framework for measuring and monitoring the on-the-ground impacts of the PES scheme over time, and to demonstrate the benefits of ecosystem protection to potential buyers of the Chyulu Hulls ecosystem services. The account can be accessed here: https://planengageuk.alytics.com/unpublished/chyulu-hills-dnca/home.

2. Chapter 2: Overview of the Chyulu Hills PES Scheme

The aim of this chapter is to provide a background and context of the Chyulu Hills area, the key ecosystem services provided, the rationale for the PES scheme, and the scheme structure proposed in the baseline report. This section also provides a summary of the key challenges faced by the proposed PES scheme as identified in the baseline report and highlighted through stakeholder consultation, and sets out how these have been addressed in this report.

2.1 What are the Chyulu Hills?

The Chyulu Hills are located in the south east of Kenya, on the edges of the world famous Tsavo West and Amboseli National Parks. They are a volcanic mountain range made up of a series of hills which emerge from the surrounding lower lying plains. The area rises from an altitude of around 600 m to 2,200 m above sea level along the highest summits. Covered with biodiversity-rich forests, the Chyulu Hills are a unique ecosystem in an otherwise generally arid area that provide a home to 450 species of bird, as well as endangered mammals such as black rhinos, African elephants, lions, leopards, and cheetahs.

The naturally forested areas of the Chyulu Hills are recognised as one of Kenya's Water Towers (areas of forest in mountainous areas that provide important water regulation services), and play a role in regulating freshwater for the catchment. The high elevation of the Chyulu Hills creates a natural barrier which forces the prevailing wind upwards, leading to precipitation as the water vapor cools and condenses. In addition to the topography of the hills, the cloud forests at the highest elevations create optimal conditions for promoting cloud formation and interception, while fog deposition on vegetated areas provides an additional source of moisture[14].

The water captured by the forests infiltrates into an underground aquifer storing up to 600 million cubic metres of water.[15] This water flows downwards to form a number of springs, the most significant of which is the Mzima Springs located around 30 kilometres to the south in Tsavo West National Park. A pipeline from these springs, constructed in the late 1950s, is a key water source for Mombasa – Kenya's second largest city – which is increasingly looking to the Mzima Springs to provide an important component of the additional water needed to support its growing population and industry.

2.2 What are the key ecosystem services provided by the Chyulu Hills?

The Chyulu Hills ecosystem is made up of a mix of forest, transitionary habitats, grassland, and converted land that support a range of species including the Critically Endangered eastern black rhino. The vegetation density and carbon stocks tend to increase with elevation, with cloud forests at the highest elevations having the greatest densities. The area contains several important water sources including the Mzima, Nol Turesh, and Umani springs, with the Mzima Springs being the most important in terms of volume and discharge of water provided. There are a range of soil types across the area with productivity increasing towards the slopes of Kilimanjaro in the south.

Natural capital assets in the area provide ecosystem services including crops and livestock, non-timber forest products (NTFPs), water supply, global climate regulation, water quality regulation, hazard regulation, disease and pest control, tourism, and biodiversity (in this case measured in terms of supporting the critically endangered rhino population, which is only one component of the total biodiversity value).

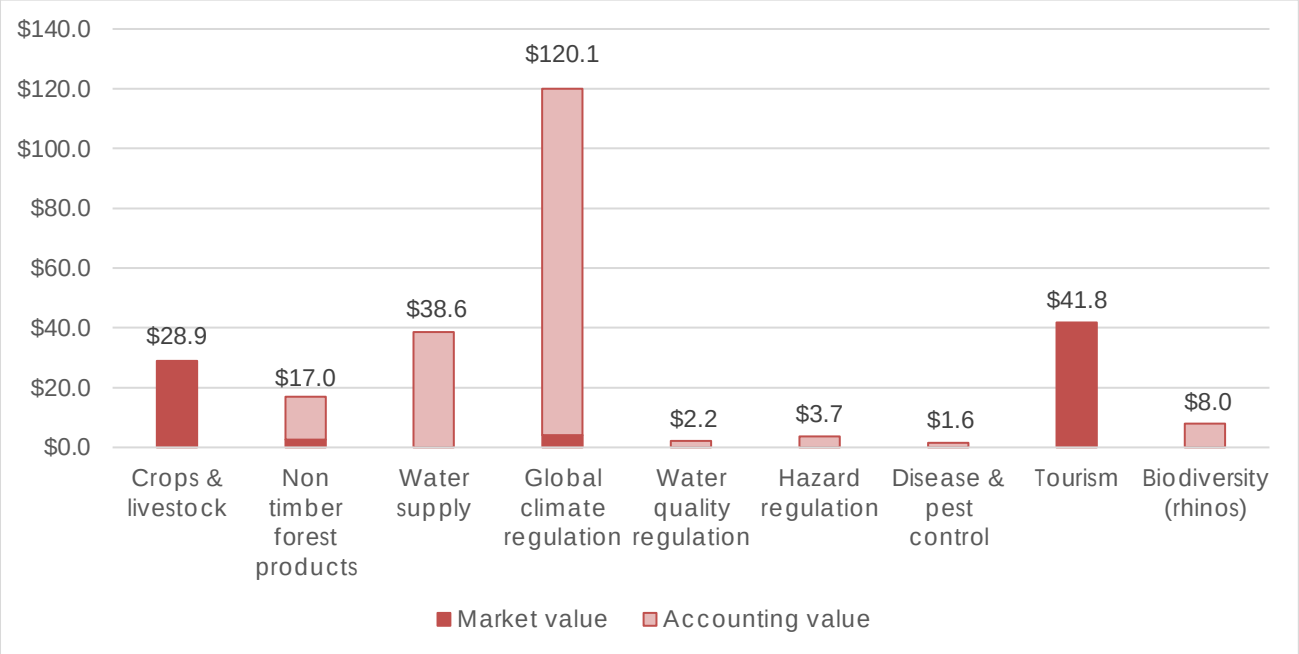
[14] MWCT (2019) 'The Great Chyulu Hills Reservoir'.
[15] Tuite, C. (2019), 'Chyulu Hills Blue+ Water Project'.

It is important to note that *"many forms of natural capital do not have markets at all – they are free to all who use them".*[16] In light of this, the baseline report made a distinction between the 'market value' and the 'accounting value' of the services being provided, where 'market value' is an estimate of value based on the free exchange of services in a marketplace, and 'accounting value' is an estimate of a service's *"contribution to societal well-being"*. Many of the ecosystem services provided by the Chyulu Hills are not traded in marketplaces and so are assigned a low or even zero market value. As such, accounting values are provided to demonstrate the societal value of these services outside of existing markets.

The total annual accounting value of these services is estimated to be around $261.9m (see Figure 2.1)[17] based on the calculations undertaken in the baseline report. Given that the project area covers around 410,534 ha, the average accounting value of protecting a hectare of land is estimated to be around $638, with the forested areas, and cloud forest areas in particular, having even higher values. This compares to an average cost of protecting each hectare of just $46, generating an additional $14 in value for every $1 spent on conservation in the Chyulu Hills.

While the accounting value of ecosystem services is significant in the Chyulu Hills, there are several services for which the market value is essentially zero, including water supply, water quality regulation, hazard regulation, disease and pest control, and biodiversity. This may create issues over their long term sustainability as their value is not accounted for in the marketplace and there is little financial incentive for land managers to continue providing these services. Of these services, water supply is a particularly high priority service – contributing up to 30% of the City of Mombasa's water requirements – that is not currently paid for within the existing governance arrangements.

Figure 2.1 High-level estimate of the income and value of ecosystem services provided by the Chyulu Hills each year ($millions)



Source: GNIplus (2021), 'Design and implementation of a Water Payment for Ecosystem Services Scheme in the Chyulu Hills: Baseline Report'
Note: this is a broad estimate and should be taken as indicative of total value rather than a detailed calculation.

[16] Dasgupta (2021), 'The Economics of Biodiversity: The Dasgupta Review'.
[17] Note, other studies have been undertaken to value the ecosystem services provided by the Chyulu Hills and have used different methodologies. All of the assumptions and estimations used are presented in the baseline report.

2.3 What is the need for a Chyulu Hills PES scheme?

Despite the importance of the Chyulu Hill's forests for water regulation and other ecosystem services, the area is facing increasing exposure to anthropogenic threats and pressures (i.e. those originating from human activity). Some of the most prominent pressures that the forests currently experience include charcoal burning (as a source of cooking fuel), illegal harvesting of wood products, over-grazing, and slash and burn degradation to clear and convert forest areas to agricultural land[18].

This is exacerbated by the continuing increase in the population of the Chyulu Hills area, with high population densities now present around the Tsavo West National Park. Many towns and villages have expanded and new communities are emerging[19]. Larger populations lead to increased demand for natural resources including water, charcoal, and land.

The impacts of climate change may also be contributing to forest pressures across the Chyulu Hills. Higher temperatures and more variable precipitation rates may lead to greater incidence and severity of droughts, resulting in tree mortality and the drying up of rivers and springs. Climate change is also likely to result in the increased occurrence and intensity of forest fires which could clear large areas of forest habitat across the region[20].

Decreases in forest cover as a result of these pressures may impact the extent to which rainwater infiltrates into the ground. This could have a knock-on impact on the overall groundwater level, which could ultimately lead to reduced water discharge at the various outlets in the Chyulu Hills watershed, including the Mzima Springs[21].

The forests of the Chyulu Hills are currently included in the project area of a REDD+ scheme which is scheduled to operate from 2013 to 2043. The scheme is certified under the Verified Carbon Standard (VCS) and the Climate, Community, and Biodiversity standard (CCB). The objectives of the scheme are to prevent the emission of 20 million tonnes of CO_2e by stopping deforestation, forest degradation, and grassland conversion in the Chyulu Hills.

Uncertainties in the voluntary carbon market, together with declining income from ecotourism, unpredictable and often short-term philanthropic support, climate change pressures, and growth in the demand for land and resources in the region, mean that the scheme is unlikely to be able to fully protect the forests and maintain water supplies downstream. Financial details from the project over the period 2017 to 2021 reveal that carbon has so far been sold at an average price of about $6.50 per tonne, meaning that the project is facing a budget shortfall in the millions of dollars each year to fully fund the resource protection activities needed and provide meaningful levels of economic support for local communities. However, 2021 has seen a significant increase in demand for carbon credits.

Financial constraints are a widely acknowledged challenge facing carbon-focused PES schemes, with a paper in *Nature* finding that "*~80% (1.24 billion ha) of forest carbon sites would be financially unviable for failing to break even over the project lifetime. From a conservation perspective, unless carbon prices increase in the future, it is imperative to implement other conservation interventions, in addition to carbon finance, to safeguard carbon stocks and biodiversity in vulnerable forests.*"[22]

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[18] Freund (2015), 'The Chyulu Hills REDD+ Project: Project Description', VCS Version 3, CCB Standards Second Edition.
[19] Kenyan Water Towers Agency (2018) 'Kenya Water Towers Status Report'.
[20] Freund (2015), 'The Chyulu Hills REDD+ Project: Project Description', VCS Version 3, CCB Standards Second Edition.
[21] Kenyan Water Towers Agency (2018) 'Kenya Water Towers Status Report'.
[22] Koh et al. (2021), 'Carbon prospecting in tropical forests for climate change mitigation', https://www.nature.com/articles/s41467-021-21560-2

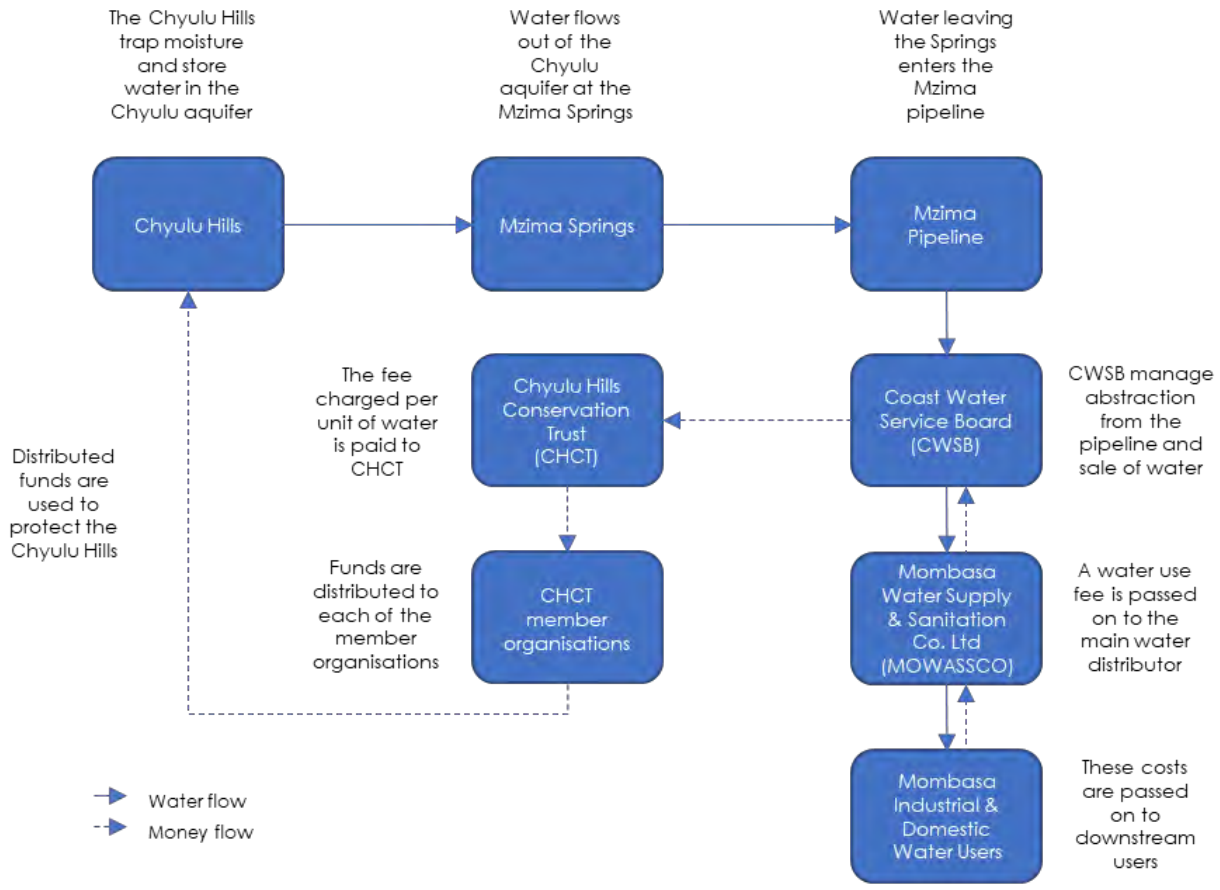
2.4 What is the proposed structure for the Chyulu Hills PES scheme?

The aim of this project is for GNIplus to work with the Chyulu Hills Conservation Trust (CHCT), a consortium of nine local stakeholder organisations[23] and the Maasai Wilderness Conservation Trust (MWCT) who act as 'Project Office' for the REDD+ Project (hereafter referred to as CHCT), to help design and implement a PES scheme in the Chyulu Hills which would serve to maintain downstream water supplies and other ecosystem services through the preservation of the forests that help to provide them.

A further aim is that this scheme will work alongside the existing REDD+ Project, developing a broader portfolio of ecosystem service payments that increases overall revenue for conservation and the delivery of economic and social benefits for local communities. Broader and more diverse sources of revenue would also provide greater stability and predictability of revenue flows in the event that external factors adversely impact ecotourism, carbon markets, or philanthropic support.

The initial structure of the scheme, as set out in the baseline report, was for funds to be raised through application of a fee per unit of water abstracted from the Mzima Springs pipeline, with a potential fee being suggested at around $0.10 per m^3. A diagrammatic overview of the proposed PES scheme is set out in Figure 2.2 below.

Figure 2.2 Overview of the proposed Chyulu Hills PES scheme structure



Source: GNIplus (2021), 'Design and implementation of a Water Payment for Ecosystem Services Scheme in the Chyulu Hills: Baseline Report'

[23] Kenya Wildlife Service (KWS), Kenya Forest Service (KFS), Maasai Wilderness Conservation Trust (MWCT), Big Life Foundation, Sheldrick Wildlife Trust, and Group Ranches Rombo, Kuku, Kuku A, and Mbirkani.

2.5 What are the challenges faced by the proposed Chyulu Hills PES scheme?

The baseline report, and the feedback received on the report, identified a number of challenges that need to be addressed by the proposed Chyulu Hills PES scheme. These related to:

- Developing the evidence base
- Establishing the financial case
- Clarifying the legal basis
- Integrating with other schemes

Further details on these challenges are set out in the sections below.

2.5.1 DEVELOPING THE EVIDENCE BASE

The first challenge is around developing the evidence base for understanding the link between protecting forest cover and maintaining water supplies at the Mzima Springs. Research undertaken as part of the baseline report found that the link between changes in forest cover and water supplies in the Chyulu Hills is complex.

The research found that cloud forests within the Chyulu Hills play an important role in regulating water quantity within the area through generating fog and increasing rainwater infiltration rates. This can increase sub-surface water storage as well as surface water flows (particularly during the dry season). As set out in the baseline report, those areas of forest which provide a positive role in enhancing water supply help to generate around 800 m^3 of water per ha of forest per year.[24]

However, not all areas of forest provide a positive impact on water quantity, and not all changes in cloud forest cover within the Chyulu Hills necessarily lead to changes in water flows at the Mzima Springs, given the complexity of the hydrological system and the lack of on-the-ground data to verify how water moves through the catchment.

As a result, given the current level of knowledge, the baseline report concluded that it may be difficult to establish a PES scheme focused on protecting forests within the Chyulu Hills to maintain water supplies at the Mzima Springs based on a direct relationship between the area of forest protected and the quantity of water delivered at the Springs. Instead, it was concluded that there may be a stronger case, at least initially, for building a PES scheme in the Chyulu Hills that is focused around protecting the hydrological system in its current state, and maintaining the full suite of ecosystem services provided.

The baseline report recognised that the Chyulu Hills is a complex system with significant uncertainties and, as the Mzima Springs are one of very few sources of water for Mombasa, the city's water supply is highly vulnerable to changes in the system. Given the reliance on the Springs, the impacts of any change would be highly significant, and so the baseline report concluded that it is better to conserve the upstream catchment as it is now, since in this state the Springs fulfil the demands required of them. Investments in protecting the Chyulu Hills as a functioning ecosystem may not give a clear short term return but may help to avoid the catastrophic economic impact of losing water supply to Mombasa through significant system change or even collapse.

[24] GNIplus (2021), 'Design and implementation of a Water Payment for Ecosystem Services Scheme in the Chyulu Hills: Baseline Report'.

Over the longer term, it is likely that continuing deforestation of the Chyulu Hills area could affect the reliability and viability of Mzima Springs as a water source for Mombasa. As the evidence base is developed over time, the case for establishing a PES scheme focused specifically on addressing water supply issues could become clearer.

2.5.2 ESTABLISHING THE FINANCIAL CASE

A further challenge facing the proposed Chyulu Hills PES scheme lies in establishing a solid financial case for securing investment. This is something which was raised in the literature review as being a key challenge facing PES schemes in Kenya, and globally:

"Ultimately, the strongest driving force for a successful PES scheme is the existence of demand for ecosystem services by beneficiaries who also have the capacity to pay for these. However, identifying beneficiaries and establishing their capacity to pay can be challenging to establish in practice. There is very little evidence in any of the schemes of an ex post analysis of the costs and benefits having been undertaken, or how effective they have been at delivering outcomes. This lack of information can make it harder to convince other stakeholders of the effectiveness of PES schemes in Kenya. Further, even if a business case can be established, it needs to convince the buyers to engage if it is to be successful."

Evidence gathered in the baseline report found that demand for the water coming from the Mzima Springs is high, and is likely to increase over time. The Mzima Springs is a crucial water source for the city of Mombasa, and the demand is expected to increase by 105% from 2015 to 2035. In order to help meet this demand, a second pipeline is planned to be constructed at the Springs (to be completed by 2030) taking the total capacity up from 35,000 m^3/day to 105,000 m^3/day.

However, even with this increase in water supply from the Springs, and other options coming on line such as the Mwache Dam[25], Mombasa is projected to experience a water demand-supply imbalance by 2035. Further, this projection relies on the completion of several expensive and complex water infrastructure projects on time and to capacity. By 2043 and beyond the situation is increasingly uncertain. The continuing supply of water flowing from the Mzima Springs is therefore critical for Mombasa. This suggests that demand for water provided by the Chyulu Hills could form a solid basis for a PES scheme.

That said, there are challenges to the implementation of such a scheme, including other water users abstracting water from the pipeline before it reaches Mombasa, together with the practical challenges associated with increasing fees for water users. A more fundamental challenge was also raised during stakeholder consultation following completion of the baseline report, where it was suggested that the proposed fee per unit of water (initially suggested at around $0.10 per m^3) would be challenging to secure in the current financial climate, in particular because the cost of water in Mombasa is one of the highest in Kenya. Further, the uncertainties in the evidence base around the role of forests in maintaining water flows at the Mzima Springs may make it difficult to make a convincing case to potential buyers.

[25] The Mwache Dam, identified by the Government of Kenya as a flagship project under Vision 2030, has the potential to supply 220,000 m^3/d, 80% of which (186,000 m^3/d) would be used to augment water supplies to Mombasa. It was envisaged that the first phase of Mwache dam would come online by 2020 with the ability to supply 95,585 m^3/d to Mombasa but the construction contract was only awarded in 2019 and reports suggest that construction will begin in early 2021. For further information see: GNI[plus] (2021), 'Design and implementation of a Water Payment for Ecosystem Services Scheme in the Chyulu Hills: Baseline Report'.

In light of these challenges, a more detailed financial analysis was undertaken to address these issues and explore the potential financial mechanisms that could support the PES scheme. The analysis considered the possibility of a scheme focused on the broad suite of ecosystem services and one focused solely on water supplies, with the results set out in Chapter 3 of this report.

2.5.3 CLARIFYING THE LEGAL BASIS

As part of the baseline report, a review was undertaken to understand the legal context in which the proposed Chyulu Hills PES scheme might operate. The review of Kenyan legislation found that the proposed scheme was possible under Kenyan law. However, Kenya does not have one overarching law or policy on compliance-based or voluntary PES schemes. In the absence of a specific law operationalising a PES scheme, and in light of the nature of the proposed Chyulu Hills PES scheme, the Water Act is the most relevant piece of legislation.

The baseline report found that the proposed Chyulu Hills PES scheme would be possible under the current legal framework but only if: (i) a Water Resource User Association (WRUA) is used to collect and disburse the PES fees generated from the downstream users under an MoU with the Water Resources Authority (WRA) for conservation and collaborative management of water resources; or (ii) CHCT is designated as a revenue collector by the WRA under a negotiated agreement that allows CHCT to further disburse the collected PES fees to the upstream catchment managers. If neither of these options is possible, amendments to the Water Act, 2016 would be needed in order for the proposed PES scheme to be compliant with the law.

It was noted that the WRA currently collects a conservation fee where abstraction is from a groundwater conservation area or a protected area gazetted under the Water Act. This could create an issue of additionality if another entity also collects a water fee for conservation through a PES scheme. In light of this, the baseline report recommended that the WRA should be involved at the design stage of the scheme in order to determine how the seller, operating as a WRUA, or in the alternative, as a water revenue agent, can collaborate with the WRA to access and disburse the afore-mentioned fees.

In addition to this, the Water Services Regulatory Board (WASREB) evaluates, recommends, and approves the imposition of water tariffs on consumers by the water service providers. Once any tariffs are agreed for the proposed PES scheme, the Coast Water Services Board (CWSB) and Mombasa Water Supply & Sanitation Company (MOWASCO) would need to approach WASREB to make their proposal for tariff review. Only after going through this review process, would they and the PES scheme gain WASREB's approval to implement any additional charges, in line with consumer protection standards.

The review in the baseline report focused specifically on a Chyulu Hills PES scheme in which water users would pay a fee for each unit of water abstracted from the Mzima Springs. Following the conclusions of the baseline report, it was suggested that a revised PES scheme could look at securing payments for the broader suite of ecosystem services provided by the Chyulu Hills, rather than focusing specifically on water resources, at least within the short term. This shift would create a new legal context which would need to be understood in order for any scheme to progress. In light of this, an additional legal review focused on the revised scheme was undertaken with the results set out in Chapter 4 of this report.

2.5.4 INTEGRATING WITH OTHER SCHEMES

The stakeholder consultation process also identified that the Nature Conservancy is working with partners in Mombasa to look at how a water fund could be set up to help secure the long term

sustainability of water supplies in the area. This project is looking at sustainable land management practices for the water catchments that provide water to Mombasa, including the area around the proposed Mwache dam and the Chyulu Hills and Mzima Springs catchment.

The challenge for the Chyulu Hills PES scheme lies in being able to integrate efficiently and effectively into this broader framework, as well as the existing REDD+ framework, to create an overarching scheme which meets the needs of multiple partners, and does not stand separate to the water fund and therefore lead to confusion amongst potential buyers of the ecosystem services provided.

In light of these challenges, a revised PES scheme structure is proposed in Chapter 5 of this report, which sets out how the PES scheme could align with the REDD+ and Mombasa Water Fund schemes.

2.6 Summary of the Chyulu Hills PES scheme

Natural capital assets in the Chyulu Hills provide a number of ecosystem services including crops and livestock, non-timber forest products (NTFPs), water supply, global climate regulation, water quality regulation, hazard regulation, disease and pest control, tourism, and biodiversity. The total annual accounting value of these services is estimated to be around $261.9m, with water supply making up around $38.6m[26]. Given that the project area covers around 410,000 ha, the average value of protecting a hectare of land is estimated to be around $638, with the forested areas, and cloud forest areas in particular, having even higher values. This compares to an average cost of protecting each hectare of just $46,[27] generating an additional $14 in value for every $1 spent on conservation in the Chyulu Hills.

The aim of this project is for GNI^plus to work with the Chyulu Hills Conservation Trust (CHCT), a consortium of nine local stakeholder organisations[28] and the Maasai Wilderness Conservation Trust (MWCT) who act as 'Project Office' for the REDD+ Project (hereafter referred to as CHCT), to help design and implement a PES scheme in the Chyulu Hills which would serve to maintain downstream water supplies through the preservation of the forests that help to regulate this water through application of a fee per unit of water abstracted from the Mzima pipeline.

The baseline report, and the feedback received on the report, identified a number of challenges that need to be addressed by the proposed Chyulu Hills PES scheme:

- Developing the evidence base around the role of forests in protecting water supplies.
- Establishing the financial case for the scheme.
- Clarifying the legal basis of a potential PES scheme.
- Integrating with other schemes in the area, particularly the proposed Mombasa Water Fund.

The following chapters explore these challenges in further detail.

[26] Note, other studies have been undertaken to value the ecosystem services provided by the Chyulu Hills and have used different methodologies to arrive at the values. All of the assumptions and estimations used to arrive at the values are presented in the baseline report.
[27] This calculation is based on the figures presented in the baseline report i.e. total estimated cost of protecting the Chyulu Hills area ($18.8m/yr) / total area of land within the Chyulu Hills project area (410,534 ha) = $46/ha/yr.
[28] Kenya Wildlife Service (KWS), Kenya Forest Service (KFS), Maasai Wilderness Conservation Trust (MWCT), Big Life Foundation, Sheldrick Wildlife Trust, and Group Ranches Rombo, Kuku, Kuku A, and Mbirkani.

3. Chapter 3: Financial Analysis

This section provides a more detailed breakdown of the financial analysis for the proposed Chyulu Hills PES scheme, looking at the extent of the funding gap that needs to be addressed and the potential for different financial mechanisms to be implemented to close this gap, as well as proposing a recommended mechanism that could be adopted going forward.

3.1 Understanding the funding gap and its effects

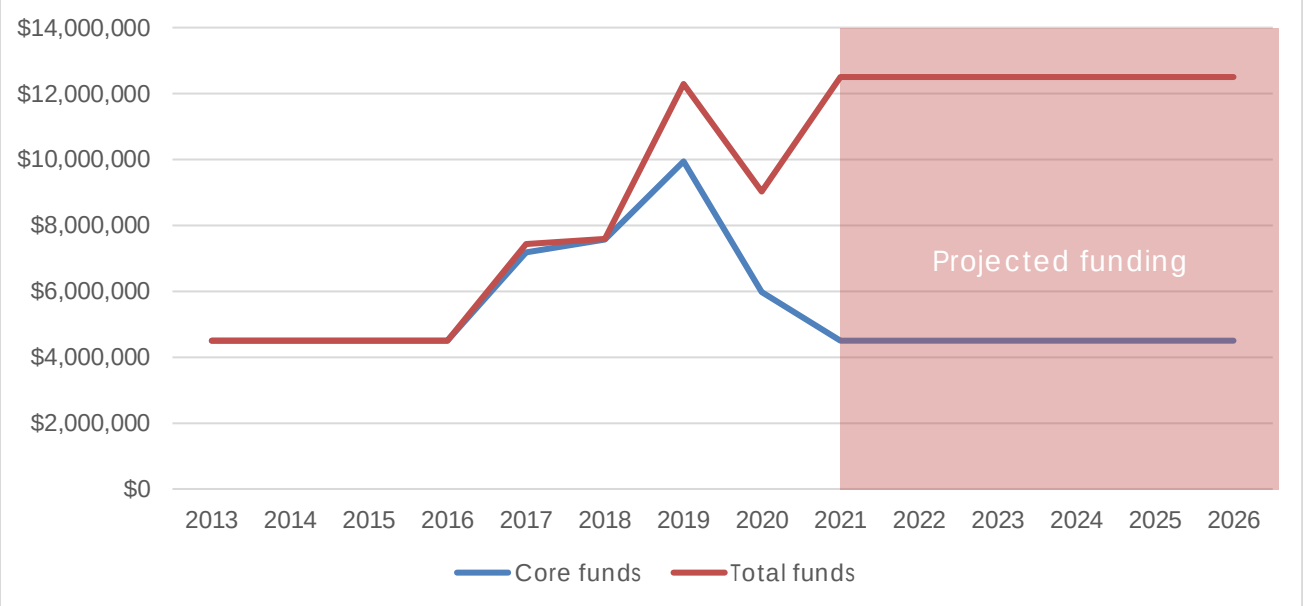
In order to estimate the projected funding gap, it is important to understand the historic level of conservation funding in the landscape, as well as the projections for the coming years.

Historically, the amount of funding to support core conservation and community benefits in the Chyulu Hills has been in the range of $4.5m to $9.9m per year and has varied significantly year on year. This funding has been raised largely from philanthropic sources and bilateral/multilateral aid, together with smaller amounts from the Kenyan government, conservation fees, interest and investments, and other sources. The first revenues from carbon credit sales were generated in 2017, and over the period from 2017 to 2020, total carbon revenues have been in the range of $0.01m to $3.1m per year.

The figure below shows a breakdown of core funding and carbon revenues over the period 2013 to 2020, together with projections of the potential revenues from 2021 to 2026 developed in the baseline report. This data suggests that 2019 was historically CHCT's most successful year, with the organisation managing to execute a budget of $12.3m. This amount dipped to $9.0m in 2020. Part of the variance in income was due to the variance in carbon credit sales over and above the core funding and other income sources.

In deriving the projected funding estimates set out below, it was assumed that the total annual funds achieved in the coming years would be around $12.5m. This amount was derived from the assumption that philanthropic sources would continue to provide around $4.5m per year while carbon credits sales would contribute $8.0m steadily into the future as shown in Figure 3.1.

Figure 3.1 Historic funding (2013-20) and projected funding (2021-26 highlighted by red background) including core funds and carbon revenues



Source: CPI, 2021 based on information provided by CHCT

While philanthropic sources of funding can be unpredictable, and vary significantly year on year, the data from CHCT over the 2013 to 2020 period suggests that maintaining a projected figure of $4.5m per year is a feasible target, although it is noted that maintaining philanthropic funding over the long term can be challenging.

With regards to income from future sales of carbon credits, there is perhaps an even higher degree of uncertainty. If judged from a historic viewpoint, the graph above suggests that the projection is optimistic compared to the annual sales secured to date. This conclusion is highlighted by Table 3.2 below, which shows that, since revenue from carbon credits began in 2017, the average total funds raised have been $9.1m and, on average only $1.4m, has come from carbon credit revenue per year.

Table 3.2 Historic funds from 2017 – 2020

CHCT funds	2017 (USD)	2018 (USD)	2019 (USD)	2020 (USD)	Average (USD)
Total funds	$7.4m	$7.6m	$12.3m	$9.0m	$9.1m
of which carbon credit revenue	$0.3m	$0.01m	$2.3m	$3.1m	$1.4m
% of total budget	3.4%	0.2%	19.1%	33.9%	15.6%

Source: CPI, 2021 based on information provided by CHCT

However, while there is considerable uncertainty about maintaining future sales of carbon credits, there has been steady growth in carbon revenues from 2017 to 2020, with the proportion of the total funds contributed from carbon credits increasing over the period, reflecting a shift in emphasis from relying on philanthropic sources to a reliance on selling carbon as a marketable good. Further, over the first three quarters of 2021, carbon credit sales reached over $6.2 million. This increasing demand suggests that carbon revenues may well be able to achieve the $8.0 million per year projected in the baseline report.

Some examples of the projects that have been funded to date include direct employment of rangers, teachers, healthcare workers, researchers, and tourism facility staff. Community programmes also include support for livelihood opportunity development through the creation of grass seed banks, bee-keeping and honey production, and arts and crafts production. There have also been significant programmes supporting school infrastructure and bursaries for students. However, despite the achievements of these programmes and activities, their implementation has not been enough to fully reduce the deforestation pressures in the area.[29]

It has been estimated that in order to fully fund needed conservation action, including meaningful levels of community support, total funds of $18.8m or more per year would be needed (as detailed in Table 3.1). This amount of funding could potentially support direct income to families (an eco-dividend) as well as social programmes and full funding for direct protection of forest and wildlife resources (rangers, vehicles, equipment, supplies etc.).

[29] Note, the analysis in this section assumes that all funding stemming from: (1) Chyulu Hills Conservation Trust (CHCT) activities (i.e. through the REDD+ programme); and (2) future proposed activities (i.e. a Payment for Ecosystem Services (PES) scheme), are channelled to the CHCT.

Table 3.1 Halting deforestation budget breakdown

Item	Amount (USD/year)	Comments
Historical average core programme budget	$4.5m	Mainly obtained from philanthropic and other grant sources (amounts vary each year)
Additional forest protection	$2.0m	Additional budget item to halt deforestation
Expanded community support	$5.0m	Additional budget item to halt deforestation
Annual conservation dividend for group ranch members	$5.3m	Additional budget item to halt deforestation
Annual contribution of $2m to the CHCT endowment fund	$2.0m	Additional budget item to halt deforestation in the longer term
Total	$18.8m	

Source: Tuite & Stauch, 2020, 'Fair pricing of REDD+ carbon credits: Chyulu Hills'

Given the estimated funding requirements set out above, together with a set of assumptions around the continuation of philanthropic funding sources (at around $4.5m per year) and potential revenues from the carbon credit market (at $8.0m per year), this suggests that the aim of achieving landscape scale conservation in the Chyulu Hills is likely to face an annual budget shortfall of around $6.3m per year based on current and projected funding streams.

However, the projected funding gap is not the only financial challenge facing the Chyulu Hills REDD+ scheme, as the variability of carbon revenues raised through a REDD+ scheme can also create challenges.

The carbon credit programme has been running since 2013, although the first verification and carbon sales only occurred in 2017. As can be seen in Table 3.3 below, there is a lag between the year in which carbon credits are generated and the sale of the credits, reflecting both market demand and the verification cycle. This can create uncertainty in forecasting when sales and revenues are likely to be realised.

Table 3.3 Lag time in carbon credit sales

Number of Credits	Year Generated	Year(s) Sold
171,000	2013	2017, 2019, 2020
614,000	2014	2019, 2020
54,000	2015	2020
39,000	2016	2019, 2020

Source: CPI, 2021 based on information provided by CHCT
Note: no information was provided past the 2016 issuance.

Uncertainty also factors into the volume and price of carbon credit sales. Table 3.4 below shows the average historic price per carbon credit that the REDD+ project has been able to secure, which also varies year to year (and has actually declined over time, despite the volume of credits sold increasing).

This uncertainty in the amount of funds which can be raised each year can create challenges in long term financial planning for landscape scale conservation projects such as in the Chyulu Hills.

Table 3.4 Total revenue and price per carbon credit vintage (year sold)

Year Sold	Number of Credits	Revenue (USD)	Average USD/Credit
2017	21,000	$254,000	$12.00
2018	2,000	$14,000	$8.94
2019	391,000	$2,343,000	$6.00
2020	474,000	$3,062,000	$6.46
2021 (Q1-3)	980,000	$6,248,000	$6.38

Source: CPI, 2021 based on information provided by CHCT

In addition, meeting these projected revenues requires the maintenance of historic levels of funding from philanthropy. One of the objectives of developing PES funding through carbon and water is to decrease reliance on these very unpredictable sources of revenue, and move towards a market system where funds are raised based on the ecosystem services provided.

These two factors lead to the conclusion that, although carbon credits are likely to be an important revenue stream, it is still important to diversify and create additional revenue sources. Financial constraints are a widely acknowledged challenge facing carbon-focused PES schemes, with a paper in *Nature* finding that *"~80% (1.24 billion ha) of forest carbon sites would be financially unviable for failing to break even over the project lifetime. From a conservation perspective, unless carbon prices increase in the future, it is imperative to implement other conservation interventions, in addition to carbon finance, to safeguard carbon stocks and biodiversity in vulnerable forests."*[30]

3.2 PES revenue potential to plug funding gap

Before discussing potential revenue options that a PES scheme could provide in order to plug the funding gap, it is important to highlight the potential setup and annual operating costs of the scheme. These costs will affect the amount of revenue required to plug the gap as they would need to be covered in order for the PES scheme to be operational and generating revenue.

3.2.1 SET-UP AND OPERATING COSTS FOR A PES SCHEME

At this stage it is challenging to estimate the exact setup and annual operating costs to run a new water-focused PES scheme in the Chyulu Hills. However, we can use the following costs as a proxy, which can then be adjusted as more detailed information becomes available. The estimates set out in the tables below, while high level, are broadly indicative of potential costs, and compare to an estimated cost of $0.5m per year to operate the existing REDD+ scheme.

These estimates are based on the assumption that the existing management and operating structures that support the REDD+ project would also support a significant portion of the administration of funding derived from an additional water-based PES. One of the advantages that the Chyulu Hills faces is that the costs for operating a PES scheme may be lower than in other situations given that there is a management structure and payment system already in place which the scheme can build upon

[30] Koh et al. (2021), 'Carbon prospecting in tropical forests for climate change mitigation', https://www.nature.com/articles/s41467-021-21560-2

rather than starting from scratch.

Table 3.5 Indicative PES scheme setup costs (one-time costs)

Item	Costs (USD)	% of Costs
Studies and community engagement	$100,000	38%
Registration and legal fees	$50,000	19%
Staff (two employees on one year contracts)	$60,000	23%
Consultants (for technical and advisory services)	$50,000	19%
Total	$260,000	100%

Source: CPI, 2021
Note: these are indicative rather than accurate estimates.

Table 3.6 Indicative PES scheme annual operating costs

Item	Costs (USD)	% of Costs
Staff	$60,000	40%
Travel, rent, other	$40,000	27%
Monitoring	$50,000	33%
Total	$150,000	100%

Source: CPI, 2021
Note: these are indicative rather than accurate estimates.

3.2.2 POTENTIAL REVENUE FROM A PES SCHEME

This analysis looks at three options as to how to set up a revenue earning PES scheme for CHCT:

- Option A. Voluntary donation per area of forest protected in reflection of the broad range of ecosystem services provided.
- Option B. Unit fee based on volume of water supplied to Mombasa.
- Option C. A combination of both strategies.

Option A. Revenue potential through an annual donation per ha protected

Given the challenges in setting up a PES scheme, the extent of the evidence base, and the current financial constraints facing water users in Mombasa, one potential option is to explore a voluntary system whereby downstream beneficiaries of ecosystem services are asked to contribute to the costs of protecting the Chyulu Hills. This could include large industrial water users, tourism companies, NGOs, and other beneficiaries that have an interest in the bundle of services provided.

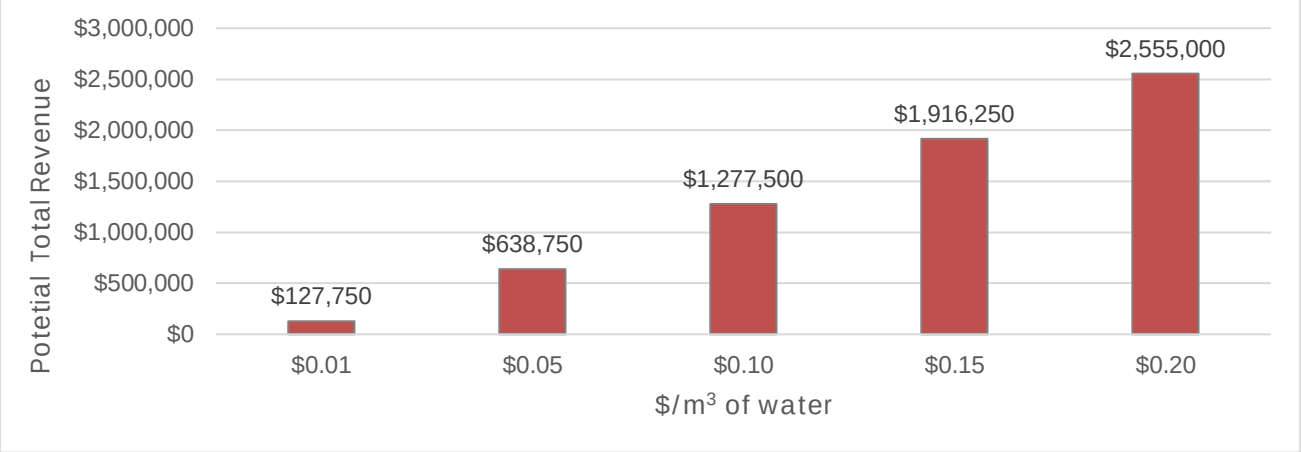
Given that the total area of forest (the ecosystem type responsible for providing the majority of services) in the Chyulu Hills project is 265,577 ha, the level of funding that would need to be targeted under such a scheme would be around $24 per ha to cover the budget shortfall of $6.3m.

A potential issue of relying on this financial mechanism in the longer term could be that voluntary donations may be difficult to sustain as the 'buyers' are not receiving a specified level of a particular service but rather they are contributing to the general provision of a bundle of services.

Option B. Revenue potential using a unit water fee

As an alternative to the land area based approach, a fee per unit of water abstracted from the Mzima Springs could be trialled. As set out in the baseline report, the Mzima Springs currently supplies around 35,000 m³ of water per day to Mombasa. The graphic below (Figure 3.2) illustrates how much revenue could be generated by implementing different water charges. This gives an indication of the total revenue that could be generated on an annual basis.

Figure 3.2 Pricing and annual estimated revenue from water

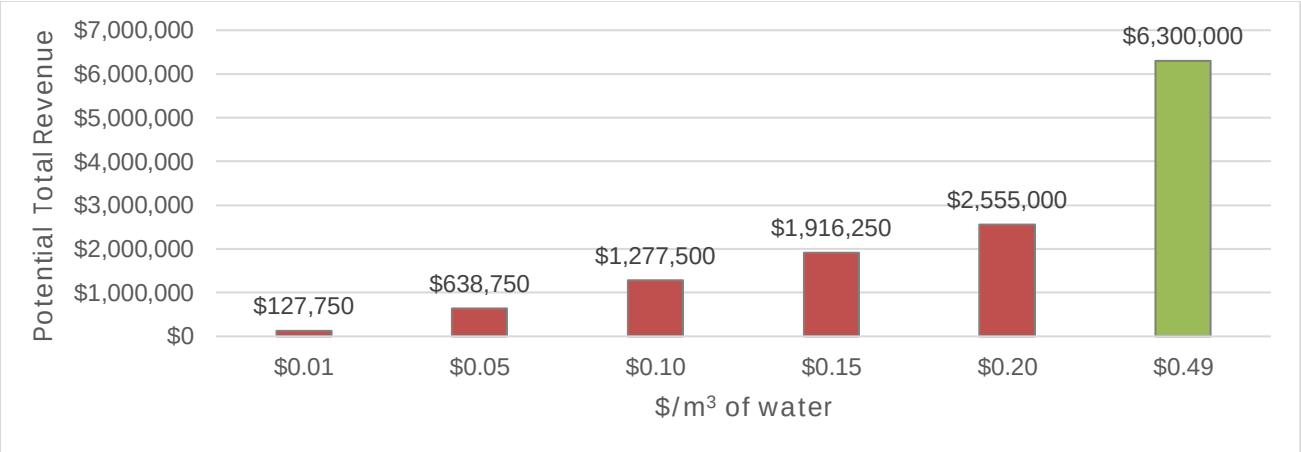


Source: CPI, 2021

Based on stakeholder consultation following publication of the baseline report, it was suggested that charging $0.10 to the end users of the water, particularly lower income households, would not be an acceptable additional tariff in the current economic climate, especially as Mombasa already has high pricing for water relative to other parts of Kenya. As shown in Figure 3.2, a fee of $0.10 per cubic metre would only generate around $1.3m per year. Even charging up to $0.20 per cubic meter would only generate just over $2.5m of revenue per year. This amount is not enough to cover the funding gap of $6.3m identified in the previous section.

In order to be able to fully fund the gap, the amount that would be needed is $0.49 per cubic metre. The graphic below illustrates how far from an "acceptable" charge this would be.

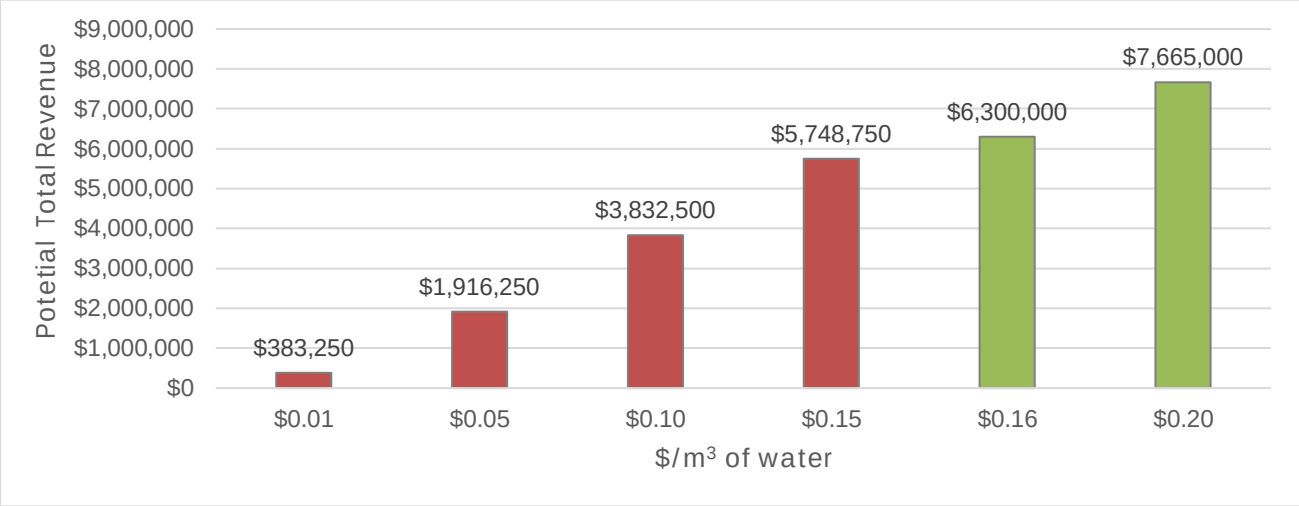
Figure 3.3 Annual estimated revenue per $/m³ of water based on one pipeline to Mombasa (green colour highlighting the unit fees that would meet the target funding gap)



Source: CPI, 2021

Looking over the longer term, however, the demand analysis in the baseline report states that there is a strong possibility that the supply from the Mzima Springs to Mombasa will be increased to 105,000 m^3 by 2030. If this is the case, the cost per unit of water to plug the funding gap would be reduced to $0.16. At this point, together with potential improvements in the evidence base, increased recognition of the importance of the natural environment in supporting water supplies, and projected economic growth, the annual fee might be at a level that is more acceptable to water users in Mombasa. The graphic below shows the fee as compared to the range of charges set out above.

Figure 3.4 Annual estimated revenue per $/m^3 of water based on two pipelines to Mombasa (green colour highlighting the unit fees that would meet the target funding gap)



Source: CPI, 2021

While this approach to water unit pricing may be more challenging to achieve than a voluntary based approach, particularly in the current situation, it provides advantages in terms of greater certainty and potential long-term sustainability as it is predicated on the beneficiaries of a specifically defined service providing a contribution to the cost of maintaining the provision of that service over the longer term.

Option C. Combination of both strategies

Considering the barriers to implementing a fully unit-based pricing system (high cost per m^3 of water and uncertainties over the data with respect to the direct link between forest cover and water supplies), an alternative option could be a combined pricing system. This would entail the funding gap being filled with a portion of funding coming from a donation per ha and complementary revenue paid by water users in Mombasa, who would pay a fee per unit of water used.

Table 3.7 below demonstrates a set of different scenarios from A to G. Each has a different percentage allocation to the voluntary donation (ha) and unit fee (m^3). This shows the resultant impact on the revenue/ha and revenue/m^3.

Table 3.7 Different scenarios for raising $6,300,000

Allocation	A	B	C	D	E	F	G
Voluntary ($/ha)	100%	80%	70%	50%	30%	10%	0%
Unit Fee ($/m^3)	0%	20%	30%	50%	70%	90%	100%
Total	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*

Allocated revenue from source	A	B	C	D	E	F	F
Voluntary ($/ha)	$6,300,000	$5,040,000	$4,410,000	$3,150,000	$1,890,000	$630,000	$0
Unit Fee ($/m³)	$0	$1,260,000	$1,890,000	$3,150,000	$4,410,000	$5,670,000	$6,300,000
Total	*$6,300,000*	*$6,300,000*	*$6,300,000*	*$6,300,000*	*$6,300,000*	*$6,300,000*	*$6,300,000*
Required price unit	A	B	C	D	E	F	F
Voluntary ($/ha)	$23.72	$18.98	$16.61	$11.86	$7.12	$2.37	$0.00
Unit Fee ($/m³) before 2nd pipeline	0	$0.10	$0.15	$0.25	$0.35	$0.44	$0.49
Unit Fee ($/m³) after 2nd pipeline	0	$0.03	$0.05	$0.08	$0.12	$0.15	$0.16

Source: CPI, 2021

In this example we are assuming the funding gap to be $6.3m. In Scenario A, voluntary donations cover 100% of the funding gap which results in a $23.72/ha payment. As we move rightward on the table from Scenario B to G the share of the funding gap to be covered by voluntary donations reduces, therefore reducing their contribution per ha. Inversely, as the share covered by the unit fee increases from B to G, the unit price increases.

A key consideration is that, once the second pipeline is built, the water supply to Mombasa would increase. This would result in a decrease in the unit price required to be charged as the allocated gap would be distributed amongst more units as illustrated in Figure 3.4. The last row of Table 3.7 provides a comparison of the price needed per m³ before and after the second pipeline.

Taking into account the paradigm shift needed in order to implement unit pricing for Mombasa water users, the fact that the expansion of supply via a second pipeline can reduce unit pricing, as well as the overall complexity of implementing such a system, a phased approach to implementation could provide an alternative option for establishing the Chyulu Hills PES scheme:

- Phase 1: first five years (2022-2026) – seeking voluntary donations based on the area of forest protected in return for the bundle of ecosystem services provided. This would allow for the fund to start educating users on pricing for ecosystem services and the importance of the Chyulu Hills ecosystem in providing water supplies to Mombasa.
- Phase 2: next four years – (2027-2030) – as the evidence base is developed and downstream users develop a better understanding of the value provided by the Chyulu Hills area, start to phase in unit pricing for water users year-on-year by decreasing the allocation of the funding gap financing to voluntary donations and increasing it to water fees.
- Phase 3: longer term (2031+) – at this point the majority of funds are now being raised by water pricing and the voluntary donations are being phased out, eventually moving towards a full allocation of financing coming from water users on a unit payment basis (paying for 100% of the funding gap). This phase is introduced at the same time as the additional provision of water to Mombasa through the second pipeline to reduce the required unit costs for the user.

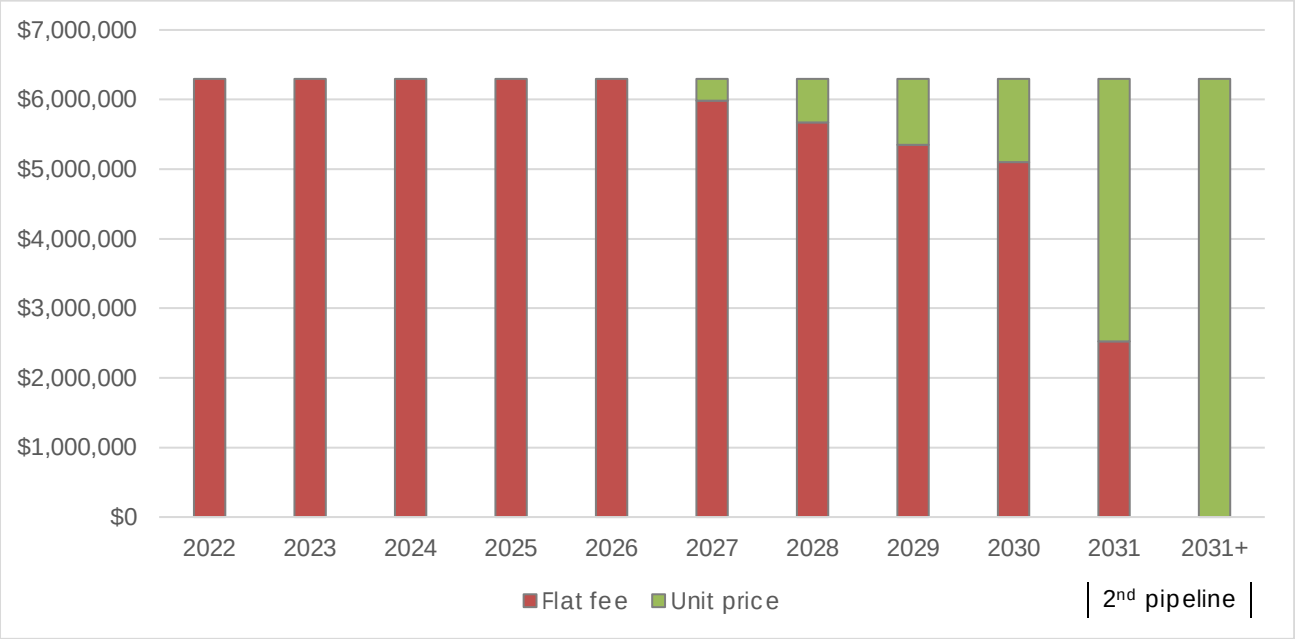
This approach is set out in the table and figure overleaf.

Table 3.9. Example unit pricing introduction using a phased approach to address a funding gap of $6.3m (all prices rounded)

Phase	Phase 1					Phase 2				Phase 3	
Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2031+
Flat Fee ($/ha)	$23.72	$23.72	$23.72	$23.72	$23.72	$22.53	$21.35	$20.16	$19.20	$9.49	$0.00
Unit Price ($/m³)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.02	$0.05	$0.07	$0.09	$0.10	$0.16
Total Flat Fee ($)	$6.3m	$6.3m	$6.3m	$6.3m	$6.3m	$6.0m	$5.7m	$5.4m	$5.1m	$2.5m	$0
Total Unit Price ($)	$0	$0	$0	$0	$0	$0.3m	$0.6m	$0.9m	$1.2m	$3.8m	$6.3m

Source: CPI, 2021

Figure 3.5 Example unit pricing introduction using a phased approach to address a funding gap of $6.3m



Source: AECOM, 2021 based on data provided by CPI

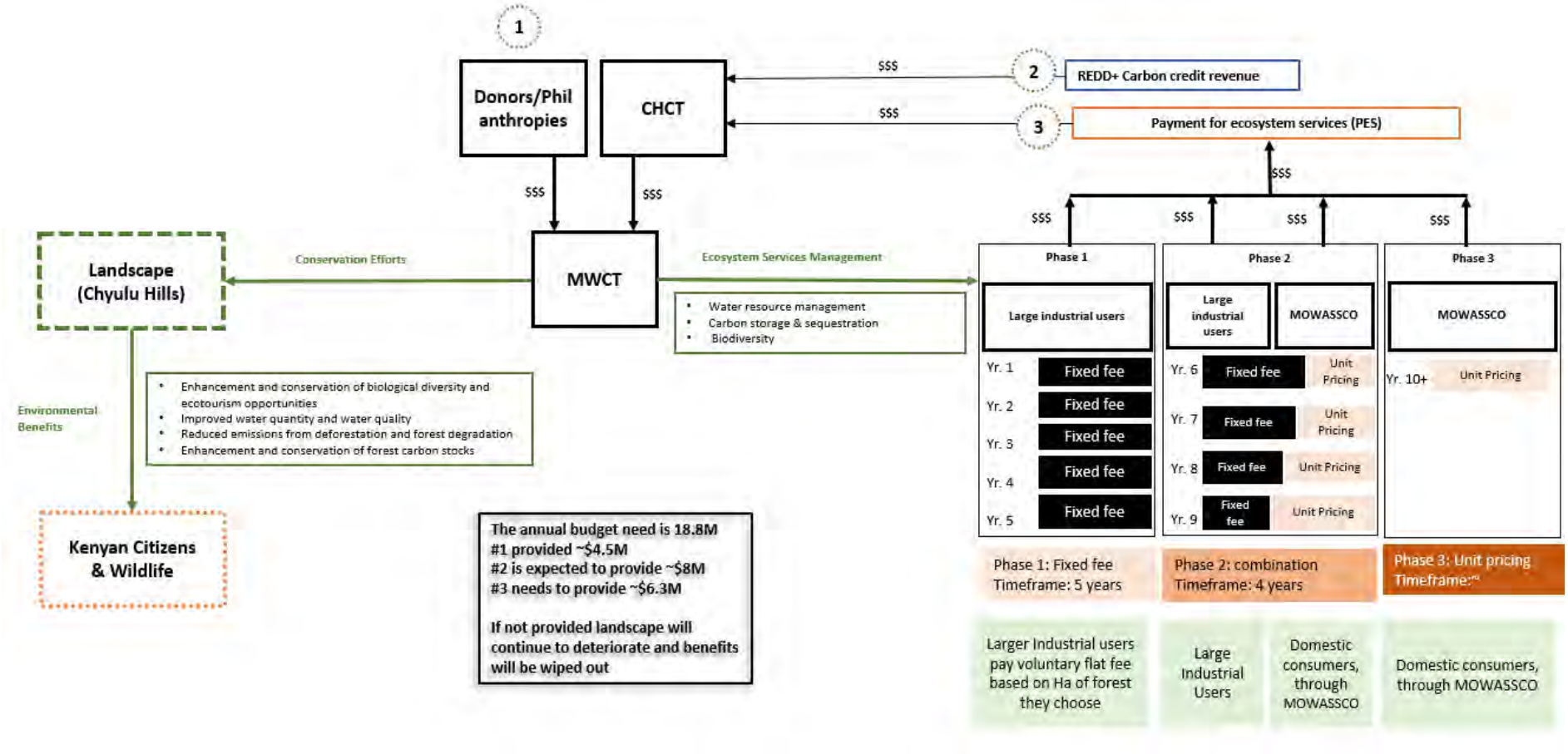
3.3 Proposed financial mechanism

In order to be able to meet its estimated budget to halt deforestation in the Chyulu Hills, CHCT plans to secure revenues from:

- Donors and philanthropists.
- REDD+ carbon credit sales through the voluntary carbon market.
- The Chyulu Hills PES scheme.

If the annual target budget is not met, the risk is that insufficient funds will lead to the forest cover gradually being depleted over time. This is a particular risk once the REDD+ project ends (in 2043), and CHCT's budget becomes entirely dependent on donations. Figure 3.6 overleaf illustrates the proposed financial instruments that could be set up to halt deforestation within the Chyulu Hills. The planned PES scheme (No. 3 in the figure below) is illustrated on the right-hand side of the graphic.

Figure 3.6 Outline structure of the proposed Chyulu Hills PES financial instrument



Source: CPI, 2021

At this stage of the scheme's design, it is proposed that, under Phase 1, voluntary donations would be sought for the first five years of the scheme based on the area of forest to be protected. This funding would help to secure the broad range of ecosystem services provided by the forests of the Chyulu Hills and large, industrial water users within the area would be targeted for financial contributions, as well as a broader range of different buyers interested in the bundle of non-carbon ecosystem services provided (e.g. biodiversity, disease and pest control, and hazard regulation).

The aim would be to incorporate the Chyulu Hills PES scheme into the Mombasa Water Fund (MWF) which is currently being designed by The Nature Conservancy. The MWF is looking to secure and improve the quantity and quality of source waters for Mombasa by channelling investments into source protection and catchment conservation measures within the watersheds that provide the City's water, the Chyulu Hills/Mzima Springs water source being a key target area.

Under Phase 2, which covers the four subsequent years, water users benefitting from the water related services provided through the Mzima Springs could be targeted for payments. It is expected that, at this stage, voluntary fees would continue to be sought from large industrial water users and other beneficiaries, but that these would reduce as the years progressed. In addition to this funding stream, it is envisaged that water consumers served through Mombasa Water Supply & Sanitation Co. (MOWASSCO) could be charged a small fee (less than $0.10 per cubic meter consumed), which would increase gradually on an annual basis. This would mean that the reliance on voluntary funds declined over time, to be replaced with a long term, fixed unit pricing mechanism.

Under Phase 3, the voluntary fee could be phased out entirely, as all water users transition to paying a fixed unit pricing fee for the water they consume of around $0.16/m^3, thereby providing a long term sustainable funding stream to help manage the Chyulu Hills ecosystem.

It is important to note that, once a PES scheme is established and agreements settled (with large industrial users and other beneficiaries in the first instance and the water company further along in the instrument's lifespan), CHCT could use the contractual cashflow to access debt or equity funding. This might be beneficial to the organisation in the event that additional investment into the landscape needs to be made in the early rather than later years.

3.4 Summary of the financial analysis

In the design stage, the baseline report considered a single payer approach focused around charging the total cost of the scheme to MOWASSCO which in turn would transfer that cost to water users. However, there are uncertainties in the existing evidence base and the estimated cost increase in the water tariff was deemed unacceptable by stakeholders which led to considering a multi-payer model that also includes NGOs, other water users, and donors.

In order to address these issues, a revised financial mechanism for the Chyulu Hills PES scheme was proposed based on a combination of two distinct pricing elements:

- Voluntary donation: beneficiaries (e.g. large industrial water users and other beneficiaries of ecosystem services) donate on the basis of each ha of forest protected to conserve the Chyulu Hills ecosystem and the bundle of ecosystem services provided.
- Unit pricing: beneficiaries (e.g. water consumers in Mombasa using water from the Mzima Springs) pay a fixed price per m^3 of water abstracted.

The proposed mechanism aims to transition from a voluntary based approach in the initial stages of the scheme design towards a unit pricing mechanism over time.

The opportunity with this approach is it allows for a broad, flexible approach to securing funding in the early stages of the scheme, when data on the impacts of forest cover on ecosystem service provision are limited and financial constraints are high. This voluntary approach is simpler and easier to set up than a fully-functioning water market and allows the scheme to target a broad range of potential buyers that may be interested in investing, although in the long term it may struggle in terms of sustaining the required level of financing given its reliance on voluntary donations.

As further data is collected, users are familiarised with the idea, the amount of water being abstracted from Mzima Springs increases, and a solid business case can be developed to clearly identify the benefits to water users for protecting the Chyulu Hills, the tiered approach allows for a transition away from a system of voluntary donations towards a fully functioning market, whereby water users pay for the benefits provided by protecting the Chyulu Hills ecosystem.

The development of such a market is complex and will require robust and reliable data, as well as trust to be built up between all sides; however, it offers the opportunity to secure a long-term approach to the financing problem facing the Chyulu Hills, as the users of the service are paying to protect its long term provision ultimately out of their own financial interest.

4. Chapter 4: Legal Analysis

This chapter provides an analysis of the policy, legal, and regulatory framework in relation to establishing a PES scheme in the Chyulu Hills that focuses on raising funds to protect the range of ecosystem services provided by the area. This analysis complements the legal analysis in the baseline report which looked specifically at the legal context for a Chyulu Hills PES scheme focused on protecting water supplies; however, reflecting the scope of the revised scheme, the scope of the analysis in this chapter has been broadened to include a suite of ecosystem services.

4.1 Background

This project is exploring the possibility of developing a voluntary PES scheme in Kenya. The proposed PES scheme would encompass the Chyulu Hills REDD+ project (the 'REDD+ project') area and involve entities located in the Mombasa area as the buyers of the ecosystem services (the 'Chyulu Hills PES scheme'). The ecosystem services under consideration include: i) water supply; ii) global climate regulation (i.e. carbon storage); iii) water quality regulation; iv) hazard regulation; v) disease and pest control; vi) tourism; and vii) biodiversity.[31]

For a PES scheme to be successful, it must be clear that the seller holds all of the rights to the ecosystem services in question, 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 services to the buyer. Clear rights to the ecosystem services are necessary to protect against other potential owners claiming payment for the ecosystem services, or other owners seeking to sell the same ecosystem services to another buyer, potentially creating a 'double claiming' issue.

This analysis focuses on the ownership of the proposed ecosystem services and the transferability of such benefits to the buyers. In general, the ownership of the ecosystem services under consideration is not clear under Kenyan law. Depending on the type of ecosystem service, relevant factors include land ownership and the jurisdiction over the resource related to the ecosystem service.

This legal analysis also highlights the laws in Kenya supporting PES generally, the land ownership of the REDD+ project site, and the specific laws relevant to each of the 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 up a national PES policy. This is an area of law that may evolve in the future and should be closely monitored as it may affect the proposed Chyulu Hills PES scheme.

4.2 Structure of the proposed PES scheme

The legal analysis in this report is based on the understanding that the activities supporting the ecosystem benefits in the Chyulu Hills PES scheme will be carried out through the infrastructure and administrative capacity that has been developed to support the REDD+ project, described in greater detail below. It is also noted that the REDD+ project extends to 2043 while the aspiration for the PES scheme is to provide sustainable funding into the future.

[31] While we focus on these enumerated ecosystem benefits in this legal analysis, the conservation of the forest through the REDD+ Project has many other ancillary benefits (e.g. allowing for the harvesting of non-timber forest products). These ancillary benefits are important results of the forest conservation activities but are largely supported through the sale and use of the products themselves.

4.2.1 PES SCHEME FLOW OF FUNDS

Our assumption is that the flow of the PES scheme funds would be structured as follows.

The sellers would be the local communities living within the REDD+ project area, together with local conservation and Government organisations responsible for managing the protected areas within the Chyulu Hills.

The sellers are currently engaged in the generation and sale of carbon credits through the existing REDD+ project. For the REDD+ project, sellers are currently aggregated and represented by CHCT, the Board of which meets on a regular basis to discuss and agree how funds raised through carbon credit sales will be allocated. It is assumed for the purposes of this analysis, that CHCT will perform a similar role in the Chyulu Hills PES scheme, facilitating agreement related to the sharing of PES funds with the sellers. CHCT currently has representatives from the following organisations: Kenya Wildlife Service (KWS); Kenya Forest Service (KFS); MWCT; Group Ranches Rombo, Kuku, Kuku A, and Mbirikani; Big Life Foundation; and the Sheldrick Wildlife Trust.

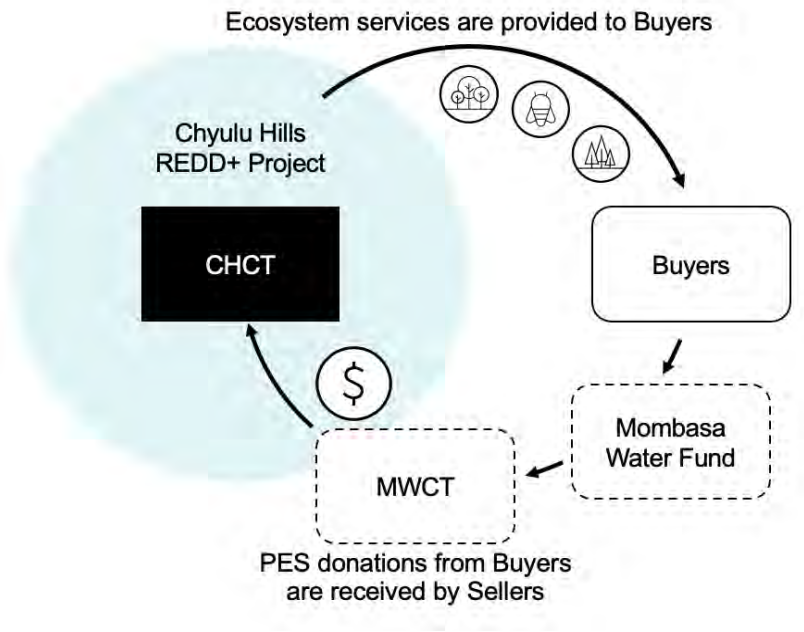
The buyers would be ecosystem service users based downstream (e.g. companies or others interested in supporting upstream activities), largely in Mombasa, who benefit from upstream activities provided through the REDD+ project that are expected to provide ecosystem services such as the maintenance of water flows and quality. Under the PES scheme, these buyers would voluntarily agree to contribute to the REDD+ project, via the Mombasa Water Fund (MWF) architecture. It is possible that the payments would be based on a particular buyer's willingness to pay rather than an external metric (e.g. abstraction of water or the level of financial support that would result in a certain level of ecosystem service provision). In this sense, the PES scheme may be socialising the concept of PES with downstream buyers rather than relying on a more robust connection between the payments and the level of benefits received.

Under the Chyulu Hills PES Scheme, it is our understanding that the sellers (i.e. ecosystem service providers) represented by CHCT (or agents on its behalf), acting through the MWF architecture, will approach potential buyers, make a case for conservation of the ecosystem, and request donations from the buyers to cover their use of specific ecosystem services derived from the REDD+ project. Willing buyers (i.e. ecosystem service users) will make donations for their use of ecosystem services with the funds used for protection of the Chyulu Hills ecosystem through the REDD+ project infrastructure, governance, and management.

Under the current concept, the buyers participating in the PES scheme will do so voluntarily and will submit their donations, potentially via the MWF which will aggregate all funds from the buyers and provide them to CHCT for distribution to the REDD+ project participants. This would likely occur through the established CHCT mechanism that is currently used for allocating carbon credit payments under the ongoing REDD+ project.

The figure overleaf illustrates the proposed Chyulu Hills PES scheme structure that forms the basis of this legal analysis.

Figure 4.1. Proposed structure of the Chyulu Hills PES scheme



Source: Pollination, 2021

4.2.2 ADDITIONALITY OF THE PES SCHEME

It is our understanding that the Chyulu Hills PES scheme would not support any additional activity upstream beyond the ongoing activities which are part of the REDD+ project. This means that the buyers' voluntary contributions under the PES Scheme would solely provide further support to the participants of the REDD+ project.

This assumption is particularly relevant to the environmental benefit connected with carbon storage. As further detailed below, the REDD+ project is already established as a REDD+ project registered under the Verified Carbon Standard (VCS) and the Climate, Community and Biodiversity standard (CCB) and is participating in carbon markets by selling its carbon credits (VCUs) to buyers (via an intermediary). As a result, and considering that the Chyulu Hills PES scheme would not involve additional activities beyond the existing REDD+ project, we recommend that the environmental benefits connected with global climate regulation (i.e. carbon storage or avoided deforestation) are not included in the Chyulu Hills PES Scheme to avoid double-claiming and potential double-counting of the same environmental benefit.

Further, as the REDD+ project is also certified under the CCB standard, it is possible that double claiming issues could arise with respect to the non-carbon environmental benefits achieved by the REDD+ activities, if the PES scheme seeks to sell these same benefits to buyers, although this case is less clear cut.

4.3 Description of the REDD+ project

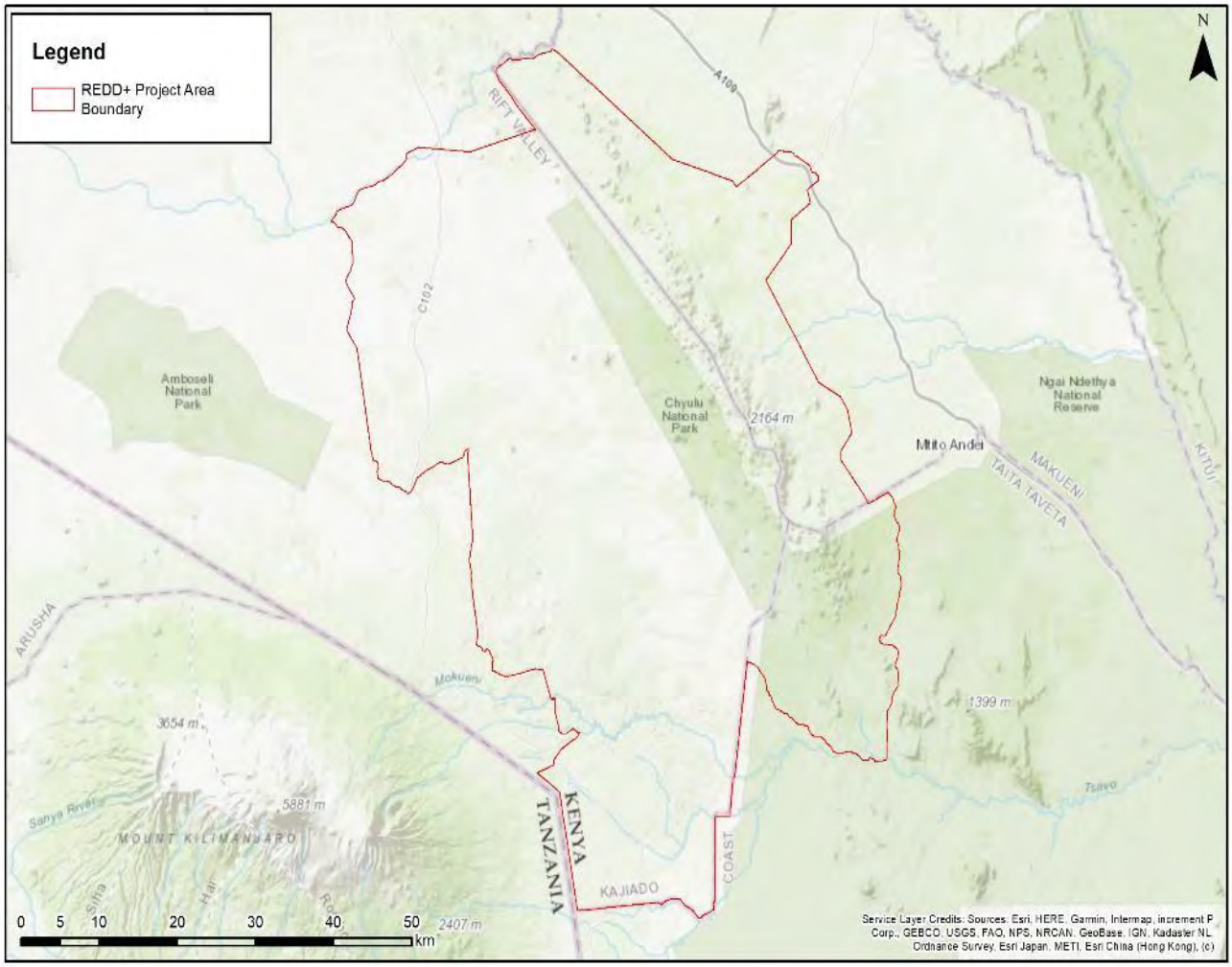
The conservation of forests and the broader landscape of the Chyulu Hills is currently managed by the nine Trustee partners of the CHCT, which is the "Project Proponent" of the REDD+ Project, scheduled to operate from 2013 to 2043. The REDD+ Project stretches over an area of 410,534 ha.[32]

[32] https://registry.verra.org/app/projectDetail/VCS/1408

The objectives of the REDD+ project are to prevent the emission of approximately 20 million tonnes of CO_2e by stopping deforestation, forest degradation, and grassland conversion in the Chyulu Hills. The REDD+ project has sold carbon credits to various buyers. These buyers hold the exclusive right to the carbon reductions represented by the credits and no other party may claim the benefit or right to such carbon reductions.

The REDD+ project area was designated based on the location of key land users impacted by the REDD+ project and comprises seven land units: 1) Mbirikani Group Ranch; 2) Kuku Group Ranch; 3) Kuku A Group Ranch; 4) Rombo Group Ranch; 5) Chyulu Hills National Park; 6) Southern Chyulu Extension (part of Tsavo West National Park); and 7) Kibwezi Forest Reserve. The map in Figure 4.2 below depicts the REDD+ project area, which includes both community land and public land.[33]

Figure 4.2 Outline of the REDD+ project area



Source: GNIplus (2021), 'Design and implementation of a Water Payment for Ecosystem Services Scheme in the Chyulu Hills: Baseline Report'

4.3.1 COMMUNITY LAND

The communally owned ranches in the REDD+ project are the Mbirikani, Rombo, Kuku, and Kuku A Group Ranches. These fall under community land, which is one of the classifications of land recognised

[33] GNIplus (2021), 'Design and implementation of a Water Payment for Ecosystem Services Scheme in the Chyulu Hills: Baseline Report'.

under the Constitution of Kenya, 2010.[34]

This is operationalised under the Community Land Act, 2016, which requires the group representatives who held land under the Land (Group Representatives) Act (now repealed), together with the communities they represent, to apply for registration as a community under the Act.[35] It is presumed that the Mbirikani, Rombo, Kuku, and Kuku A Group Ranches are now registered as community land in accordance with the terms of the Community Land Act, 2016 but this should be confirmed.[36]

A voluntary PES scheme is a viable and implicitly encouraged option for community land, as the Community Land Act makes provision for the conservation and management of community land, specifically providing that every registered community is required to establish, *inter alia*:

- Measures to protect critical ecosystems and habitats.
- Incentives for communities and individuals to invest in income generating natural resource conservation programmes.
- Measures to facilitate the access, use, and management of forests, water, and other resources by communities who have customary rights to these resources.
- Procedures for the involvement of communities and other stakeholders in the management and utilisation of land-based natural resources.[37]

The Act is further clear that natural resources found in community land shall be used and managed sustainably and productively; for the benefit of the whole community including future generations; with transparency and accountability; and on the basis of equitable sharing of accruing benefits.[38] Community landowners, as the PES sellers, may be aggregated and represented by their representatives, such as CHCT in the REDD+ project, provided that the afore-mentioned principles are adhered to.

4.3.2 PUBLIC LAND

The Chyulu Hills National Park and the Tsavo West National Park fall under the jurisdiction of the KWS as mandated in the Wildlife Conservation and Management Act, 2013 (WCMA).[39] This land is categorised as public land and is held in trust by the National Government of Kenya for the people of Kenya.[40]

The Kibwezi Forest Reserve was established by the colonial government in the 1930s. The forest is gazetted as a public forest in the Third Schedule to the Forest Conservation and Management Act (FCMA), and the National Government is the recognised forest owner,[41] whilst the Kenya Forest Service

[34] The Constitution of Kenya, 2010 Art 63 (2).
[35] The Community Land Act, 2016 repeals the Land (Group Representatives) Act (Chapter 287 of the Laws of Kenya) under which group ranches were registered. The group representatives who held land under the Land (Group Representatives) Act together with the communities they represent are required to apply for registration as a community with the procedure set out in the Community Land Regulations, 2017.
[36] This application to register as a community was to be done within twelve months of the commencement of the Community Land Regulations, 2017. See Regulation 26 (3).
[37] Community Land Act, 2016, Section 20 (2).
[38] *ibid*, Section 35.
[39] WCMA, Section 7 (a).
[40] Constitution of Kenya, 2010, Art 62 (1) (g)
[41] *ibid*

(KFS) is charged with the function of conserving, protecting, and managing public forests.[42]

The CHCT Board currently has representatives from KWS and KFS, and these entities should also be included in the Chyulu Hills PES scheme, given the oversight mandate bestowed on both entities for national parks and public forests, respectively.

It is important to note that KFS may grant rights of use in respect to a public forest to a Community Forest Association (CFA). This type of association comprises a group of local persons (members of a forest community together with other members or persons resident in the same area), who have registered as an association or other organisation to engage in forest management and conservation.

The CFA applies to KFS for permission to participate in the conservation and management of the public forest,[43] and this is enabled through a management agreement between the CFA and KFS, which grants the CFA a variety of forest user rights, including the right to enter into contracts to assist in the carrying out of specified forestry operations.[44] Under the FCMA, a CFA may enter into partnerships with other persons for the purposes of ensuring efficient and sustainable conservation and management of the forest, after obtaining approval from the KFS.[45] Such partnerships may implicitly be on PES.

The Kibwezi Community Forest Association (KICOFA) exists with management activities in Kibwezi Forest, which falls within the REDD+ project area.[46] While KICOFA is not listed as having representation in CHCT, there is a need to determine the extent of its activities in the forest, and whether it can be included as a seller in the Chyulu Hills PES scheme. Local communities may also have a role to play under concession agreements granted by KFS to an individual or organisation to utilise a public forest, as a concession area forest management plan is required to include community user rights and benefits.[47]

Other agreements on forest land in the proposed PES project area, for example, include the leasing of the Kibwezi Forest land by KFS to the Sheldrick Wildlife Trust in 2009, for a period of 30 years.[48] The Trust operates a high-end tourism lodge in the area and is represented in CHCT.

4.3.3 REDD+ PROJECT CONSENTS

In the case of the REDD+ project currently ongoing, there are already agreements in place amongst the project partners holding legal land tenure over the entirety of the REDD+ project area. Principally, each project partner has assigned the carbon rights to the project proponent, CHCT, through a duly executed Deed of Assignment filed with the Government of Kenya Lands Department Central Registry on July 29, 2015.[49]

Assuming this agreement is validly entered into by CHCT, the agreement provides enforceable and irrevocable agreements with the holders of the statutory property rights in the land, vegetation,

[42] FCMA, Section 2.
[43] *ibid*, section 48 (1) and (2)
[44] *ibid*, 49 (2) (i)
[45] *ibid,* Section 49 (1)(e)
[46] John Mwendwa Mugambi, Jane Kagendo, Mulaha Kweyu, Musingo Tito Edward Mbuvi, Influence of Community Forest Association Activities on Dryland Resources Management: Case of Kibwezi Forest in Kenya, *International Journal of Natural Resource Ecology and Management*. Vol. 5, No. 3, 2020, pp. 119-128.
[47] FCMA, Section 44
[48] Chyulu Hills Conservation Trust, *Chyulu Hills REDD+ Project PDD*, 23 June 2015. Updated 29 July 2016. At 15. Available at https://registry.verra.org/app/projectDetail/CCB/1408.
[49] Chyulu Hills Conservation Trust, *Chyulu Hills Redd+ Project Monitoring & Implementation Report.* At https://verra.org/wp-content/uploads/2016/11/CCB_IMP_REP_1408_19SEP2013_31DEC2016.pdf.

conservational, or management process that generate GHG emission reductions, which vests the right of use in the project proponent.[50] It is our understanding that this Deed of Assignment covers only carbon rights and not broader ecosystem services (e.g. water quality, hazard regulation etc.), which would require a separate approval or consent from the landowners as discussed in more detail below.

4.4 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, 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.

The laws and policies referencing PES point to the Government's interest in PES, the 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 the laws and policies that do not necessarily mention PES directly but have provisions that are key in supporting its implementation.

We also note that the Government has established a national level technical working group on PES that is intended to set a national-level PES policy. This group has not published any recommendations 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+ programme. 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 and as discussed in more detail below, we recommend excluding carbon benefits from the PES scheme to avoid misleading buyers or creating a double claiming issue, and potential inconsistency with the Government approach on carbon regulation.

A summary of the key laws and policies of relevance to PES in Kenya is provided in Appendix A.

4.5 Relevant laws related to the specified ecosystem services

4.5.1 WATER SUPPLY

The Water Act, 2016 does not mention PES specifically, but provides for the regulation, management, and development of water resources in line with the Constitution. The Act has a bearing on a water supply PES as it provides that the 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.[51]

The Act also envisions community involvement in the protection of water resources through WRUAs,

[50] *ibid*
[51] Water Act, Act No. 43 of 2016, Section 22

established as associations of water resource users at the sub-basin level.[52] These are community-based associations for collaborative management of water resources and resolution of conflicts concerning the use of water resources.[53] WRUAs collaboratively manage water resources in various ways, including:

- Under the Water Resources Regulations, 2021, which envision that WRUAs may enter into a tripartite MoU with the WRA and the respective county government for the purposes of collaborative management of a water resource and for water resource conflict resolution at a sub-basin level.[54] The Regulations also provide that the WRA shall equitably allocate financing to WRUAs for conservation and management of water resources.[55]

- A voluntary PES may be structured to compensate members of a WRUA who manage their land in a sustainable manner to provide adequate water supply to downstream users. The structuring of payments for the ecosystem service is however an important consideration in a water supply PES scheme, as the Water Act regulates the imposition of charges related to the use of water.

- The Act defines charges as follows: "*in relation to the use of water from a water resource as including fees, levies and premiums of any kind.*"[56] This is a broad definition that covers all sorts of fees related to the use of water. Under Section 12 (f) of the Water Act 2016, one of the functions of the WRA is to determine and set water use fees. Section 12 (e) of the Water Act, 2016 provides for water use charges to be collected by the WRA. The Water Resources Regulations, 2021, provide that water use charges may be paid directly to the WRA, or where applicable to a revenue collection agent appointed by the WRA.[57]

Section 42 of the Water Act further elaborates on the charges for water use as below:

- Section 42 (1) (and implementing regulations) states that a permit holder may be required to pay charges with such charges being paid to the WRA for the use of water in accordance with the terms of the permit and the Regulations prescribed by WRA.

- Section 42 (2) provides that the charges shall be determined by reference to a schedule of charges published in the Gazette by the Authority following public consultation.

- Section 42 (3) sets out that where there is an agreement between the WRA and a WRUA, the WRA may make available a portion of the water use charges to be used for financing such regulatory activities as the WRUA has agreed to undertake on behalf of the WRA.

In the event that the Chyulu Hills PES scheme included a PES payment that could be categorised as a fee, levy, or premium of any kind for water use, the scheme will be unviable because CHCT is not allowed under law to set or collect water use charges. Instead, a WRUA would need to be used to collect and disburse the PES fees from the downstream users under a MoU with WRA for conservation and collaborative management of water resources that recognises the PES scheme. Alternatively, CHCT could be designated as a revenue collector by the WRA under a negotiated agreement that allows CHCT to further disburse the collected PES fees to the upstream catchment managers.

[52] *ibid*, Section 29 (1)
[53] *ibid,* Section 29 (2)
[54] Rule 97 (7), Water Resources Regulations, 2021
[55] Rule 97 (16), Water Resources Regulations, 2021
[56] FCMA, Section 2
[57] Rule 94, Water Resources Regulations, 2021

A third option, which is the option for the proposed Chyulu Hills PES scheme, is viable. This is a donation-based payment structure where downstream buyers do not pay what can be considered a fee, levy or premium of any kind for water use, for example, pegged on a fixed amount per unit of water abstracted from Mzima Springs. Instead, buyers make a voluntary contribution to CHCT, via the Mombasa Water Fund, who approach potential buyers and make a case for conservation of the water catchment area and the protection of water supply. CHCT then collects the contributions made by willing buyers and transmits the funds to CHCT who share what is received with the PES scheme sellers involved in upper catchment conservation activities (i.e. the REDD+ project).

The PES scheme could also be structured under the FCMA which provides functions of the KFS to include management of water catchment areas in relation to soil and water conservation, carbon sequestration, and other environmental services, in collaboration with relevant stakeholders.[58] These stakeholders could include local community participants organised as a CFA, who could be recognised as amongst the PES sellers too, and represented in the CHCT.

Under Section 49(1)(e) of the FCMA, where a CFA has been granted permission to participate in the management and conservation of a forest, it shall, with the approval of the KFS, enter into partnerships with other persons for the purposes of ensuring the efficient and sustainable conservation and management of the forest. A voluntary PES could fall under such a partnership, whereby the CFA located at the REDD+ project area received payment from PES buyers for the Chyulu Hills REDD+ project, and as such the provision of water supply as an ecosystem service.

A voluntary water supply PES could be structured with the current CHCT membership. WRUAs or CFAs are not currently represented in CHCT. It would be ideal that, where they exist, they are involved in the PES scheme as they constitute significant stakeholders and their involvement would more effectively promote collaborative management of water resources at the REDD+ project site.

Charges introduced under the recently gazetted Water Resources Regulations, 2021 may have a bearing on the interest of buyers in participating in the PES scheme. Regulation 84 (2) provides that a person in possession of a valid water use permit or who is required to have a valid permit for water use, shall pay in addition to the water use charge, a levy amounting to 5 percent of the monthly water use charge as a water conservation levy.[59]

According to the Regulations, the monies collected by the WRA as a water conservation levy shall be paid monthly or in instalments exceeding one month,[60] and shall be segregated from the water use charges and reported on separately.[61] The monies collected shall, on the basis of agreements entered into between WRA, county government entities, and WRUAs, be used to finance part of the costs of the implementation by WRUAs and county government entities of catchment or sub-catchment soil and water conservation plans.[62] Concerns over making double payments for conservation may arise amongst potential PES buyers who are subject to these charges.

The Water Resources Regulations, 2021, further provide that an additional 10 percent shall be added to the water use charges payable for any water use within a groundwater conservation area or protected area gazetted under the Act, to cover for the cost of enhanced regulation required in such areas.[63] While there is no report of such gazettement of Chyulu Hills/Mzima Springs under the Water

[58] *ibid*, Section 8 (j)
59 Water Resources Regulations, 2021, Regulation 84 (2)
60 Ibid, Regulation 84 (6)
61 Ibid, Regulation 84 (4)
62 Ibid, Regulation 84 (4)
63 Ibid, Regulation 89

Act, should this occur, water use permit holders abstracting water from Mzima Springs would be subject to the additional 10 percent charge. A water supply PES amongst buyers subject to this mandatory charge might be limited in uptake due to concerns over double payment for conservation that may arise amongst such buyers.

According to the Chyulu Hills baseline report, it was recognised that protecting the Chyulu Hills ecosystem as it currently functions is of critical importance in reducing the risk of the collapse of the hydrological system leading to significant and permanent changes in the water supply at the Mzima Springs. However, it was also found that, based on the evidence base collected to date, *"[t]here is no simple relationship between forest cover and water supplies, and forests can have a negative or positive impact on water supplies depending on the balance of fog interception and evapotranspiration…"*.[64] Within the PES Project Area, deforestation in the uplands tends to lead to decreases in surface water runoff, while deforestation in the lowlands tends to lead to increases in surface water runoff. This finding suggests that it is specifically the higher elevation cloud forests within the Chyulu Hills that contribute positively to water supplies, and not the wider forested areas.

The Report further clarifies that *"[t]hese findings suggests that, while the overall impact of forests on water supplies is complex, the cloud forests within the Chyulu Hills play an important role in regulating water quantity within the area through generating fog and increasing infiltration rates… However, not all areas of forest provide a positive impact on water quantity, and not all changes in cloud forest cover within the Chyulu Hills necessarily lead to changes in the flows at the Mzima Springs given the complexity of the hydrological system. As a result of this, it may be difficult to establish a PES scheme focused solely on protecting forests within the Chyulu Hills to maintain water supplies…"*.[65]

Given these findings, it is proposed that the initial focus of the PES scheme will incorporate additional ecosystem benefits beyond water supply, and an aim will be to build up the data and understanding of the link between forest cover and water flows at the Mzima Springs. During this time, it is recommended that any marketing and other statements produced with respect to the PES scheme appropriately communicate the current understanding of water regulation benefits resulting from the scheme.

4.5.2 GLOBAL CLIMATE REGULATION (I.E. CARBON STORAGE)

PES is expressly encouraged in the National Climate Change Action Plan 2018 – 2022 which highlights Kenya's goal to use financial innovations, including payments through ecosystem services and carbon markets to reduce deforestation and achieve low carbon climate resilient development.[66] However, how PES fits within Kenya's broader climate regulation framework is unclear.

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 both current and future 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

[64] *See* Chyulu Hills Baseline Report, 10.
[65] *Ibid*, 10.
[66] Government of Kenya, (GoK), The National Climate Change Action Plan 2018 – 2022, (GoK, 2018)

carbon benefit would be the landowner undertaking activities that lead to carbon storage or sequestration on their land, whether private, community, or public land. In the case of a public forest, KFS involvement and consent would be necessary to be able to monetise such activities. An individual, organisation, or community might 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 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.[67] This grants an individual or organisation the right of use in respect to a specific area in a public forest, for the purpose of commercial forest management and utilisation.[68]

  The concession agreement is required to detail the purpose of the concession[69] 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.[70]

  These plans are to be approved by KFS and activities are not to commence prior to the approval of the operations plan.[71] 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.[72]

- 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 the right to benefits of carbon activities as may from time to time be agreed upon between an association and the KFS.[73]

Kenya is currently in the process of developing climate change and climate-related regulations as enumerated below.

Table 4.1. **Kenya's climate change and climate**-related regulations

Law / Regulation	Implications for the Chyulu Hills 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 to commit a financial contribution to climate change activities.
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.

[67] Section 2, FCMA
[68] *ibid*
[69] Section 44 (4), FCMA
[70] Regulation 37 and Regulation 5(4) respectively of the Forests (Participation in Sustainable Forest Management) Rules, 2009
[71] Regulation 5(4), Forests (Participation in Sustainable Forest Management) Rules, 2009
[72] Langat D., et al, *Guidelines for Establishing Payment for Ecosystem Services Schemes in Kenya*, (KEFRI, 2017)
[73] Section 49 (2) (k), FCMA.

Law / Regulation	Implications for the Chyulu Hills PES Scheme
	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 a 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. - Afforestation or reforestation of grasslands located in arid and semi-arid areas and rangelands.

Source: Pollination, 2021

In practice, Kenya has largely approached carbon benefits in the context of REDD+ projects rather than specific PES schemes. Kenya has hosted several world-class REDD+ projects that have sold carbon credits to various buyers over many years. The Chyulu Hills REDD+ project is already established as a carbon project under REDD+ methodologies and is transferring its carbon credits to buyers that then hold the exclusive right to the carbon, including the right to claim the benefit of the carbon credit.

Because the REDD+ project has already been established and is participating in carbon markets, it could not also sell carbon benefits to other buyers as part of the PES scheme. This could be considered double-counting and risks that there are multiple claims to the carbon benefit. Thus, the PES scheme, because it involves the same activities as the REDD+ project, cannot fully and exclusively claim the carbon benefit from the implementation of the REDD+ project. As such, we recommend that carbon as an ecosystem benefit is not included in the Chyulu Hills PES scheme.

4.5.3 WATER QUALITY REGULATION

Water quality is regulated under the Environmental Management and Coordination (Water Quality) Regulations, 2006. The regulations provide 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 and share the same objectives with a PES scheme aimed at improving the quality of water for various uses.[74]

The Environmental Management and Co-ordination (Wetlands, River Banks, Lake Shores, and Sea Shore Management) Regulations, 2009 also have a bearing on water quality as they require owners

[74] Langat D., et al, Guidelines for Establishing Payment for Ecosystem Services Schemes in Kenya, (KEFRI, 2017).

or users of land adjacent to wetlands, rivers, lakes, or seas to prevent the degradation or destruction of the natural resources in the water bodies. These regulations do not contain provisions that impede a willing buyer and seller from entering into a voluntary PES scheme.

Further, the Water Act makes provision for community entities that could be involved in a PES scheme, such as WRUAs established as associations of water resource users at the sub-basin level.[75] These are community-based associations for collaborative management of water resources and resolution of conflicts concerning the use of water resources,[76] and a voluntary PES may be structured to involve WRUAs, for example to compensate a WRUA that manages their land to provide good water quality to downstream users.

WRUA's collaboratively manage water resources in various ways, including under the Water Resources Regulations, 2021, which envision that WRUAs may enter into a tripartite MoU with the WRA and the respective county government for the purposes of collaborative management of a water resource and for water resource conflict resolution at sub-basin level.[77] The Regulations also provide that the WRA shall equitably allocate financing to WRUAs for conservation and management of water resources.[78]

Similar to the water supply PES scheme, a water quality PES scheme could also be structured under the FCMA which provides functions of KFS to include management of water catchment areas in relation to soil and water conservation, carbon sequestration, and other environmental services, in collaboration with relevant stakeholders.[79] These stakeholders could include local community participants organised as a CFA, who could be recognised as amongst the PES sellers, and represented in CHCT.

Under Section 49(1)(e) of the FCMA, where a CFA has been granted permission to participate in the management and conservation of a forest, it shall, with the approval of KFS, enter into partnerships with other persons for the purposes of ensuring the efficient and sustainable conservation and management of the forest. A voluntary PES could fall under such a partnership, whereby the CFA receives payment from PES buyers for the conservation of the Chyulu Hills Water Tower, and as such the provision of water quality as an ecosystem service.

The viability of the PES project would depend on whether in the case of the public forest, the CFA was allowed to carry out upstream activities that improved water quality in the forest, under their management agreement with KFS. If this was the case, the CFA could sell water quality as an ecosystem service.

A voluntary water quality PES may be structured with the current CHCT membership, provided current CHCT members are involved in REDD+ project activities that protect and enhance water quality.

While it is not mandatory that a voluntary PES include a WRUA or CFA, where these entities exist at the project site and they are involved in PES activities that enhance water quality, it would be recommended that they are involved in the PES scheme. This is because they play a role in the supply of the ecosystem service and would support collaborative management of water resources at the REDD+ project site.

[75] Water Act, Section 29 (1)
[76] ibid, Section 29 (2)
[77] Rule 97 (7), Water Resources Regulations, 2021
[78] Rule 97 (16), Water Resources Regulations, 2021
[79] FCMA, Section 8 (j)

As outlined in the section on water supply, charges introduced under the recently gazetted Water Resources Regulations, 2021 may have a bearing on the interest of buyers in participating in a water quality focused PES. Regulation 84 (2) provides that a person in possession of a valid water use permit or who is required to have a valid permit for water use, shall pay in addition to the water use charge, a levy amounting to 5 percent of the monthly water use charge as a water conservation levy.[80]

According to the Regulations, the monies collected by the WRA as a water conservation levy shall be paid monthly or in instalments exceeding one month,[81] and shall be segregated from the water use charges and reported on separately.[82] The monies collected shall on the basis of agreements entered into between WRA, county government entities, and WRUAs, be used to finance part of the costs of the implementation by WRUAs and county government entities of catchment or sub-catchment soil and water conservation plans.[83] Concerns over making double payments for conservation may arise amongst potential PES buyers who are subject to these charges.

The Water Resources Regulations, 2021, further provide that an additional 10 percent shall be added to the water use charges payable for any water use within a groundwater conservation area or protected area gazetted under the Act, to cover for the cost of enhanced regulation required in such areas.[84] While there is no report of such gazettement of Chyulu Hills/Mzima Springs under the Water Act, should this occur, water use permit holders abstracting water from Mzima Springs would be subject to the additional 10 percent charge. A water supply PES amongst buyers subject to this mandatory charge may be limited in uptake due to concerns over double payment for conservation that may arise amongst such buyers.

4.5.4 HAZARD REGULATION

A voluntary PES focused on regulating ecosystem services (such as flood risk and other hazard regulation), may be developed in Kenya, provided that the PES activities carried out by the ecosystem service provider are in line with the land use rights that the landowner holds for the specific site. For example, in the case of a public forest, the rights granted under a management agreement or concession will determine what hazard regulation activities can be carried out on the land. In the case of community land, the use will be subject to any rules or by-laws the community has made with regards to conservation and rehabilitation of their land.[85]

Existing laws and regulations may, depending on their provisions, impact the PES activities that can be carried out at a particular site, and it is important to be aware of these likely legal orders that may affect PES project activity design. For example:

- The PES project will need to establish what land use requirements such as national land preservation orders already exist with respect to the conservation of the soil, or the prevention of the adverse effects of soil erosion, that could have a bearing on the proposed PES project site, if any, and adhere to them.[86]
- The PES project will also need to establish whether the county government has made a land preservation order against the owner or occupier of land, or against both the owner and occupier

[80] Water Resources Regulations, 2021, Regulation 84 (2)
[81] *Ibid*, Regulation 84 (6)
[82] *Ibid,* Regulation 84 (4)
[83] *Ibid,* Regulation 84 (4)
[84] Ibid, Regulation 89
[85] Community Land Act, Section 37 (c)
[86] Agriculture and Food Authority Act, Section 23

either at the same time or at different times.[87] This information would be available in a publicly accessible register.[88]

For the Chyulu Hills PES scheme, the activities being implemented as part of the REDD+ project must be in line with the rights of the various landowners. Assuming they are consistent because the REDD+ project is operational, the landowners would likely be able to transfer the hazard regulation benefits to PES buyers.

4.5.5 DISEASE AND PEST CONTROL

Forests play an important role in regulating diseases and pests, and deforestation can change the microclimate of an area, resulting in an increase in vector borne diseases.[89] As set out in the Chyulu Hills baseline report:

"*[a] study of the montane forests of Kenya, for example, found that deforestation can change the microclimate of an area, resulting in an increase in vector borne diseases. In particular, deforestation exposes areas to greater sunlight, increasing the ambient temperature in the area and increasing the temperature of stagnant pools of water, which may act as breeding sites for vector insects, with the malaria-carrying mosquito being the vector most sensitive to change in forest cover.*"[90]

REDD+ activities maintaining forest cover may therefore generate and sell disease control services where disease control regulation can be linked to the ongoing REDD+ activities (in this case incidence of malaria borne by mosquito populations).

A voluntary PES could also be set up focused on the provision of pest control services aimed at sustainably managing and reducing increased incidences of pests affecting crops, livestock, fish, and trees. This may be through breeding and promoting the use of crop and forage varieties, livestock breeds, fish, and tree species that are tolerant to common and emerging threats.

This may be on community land, which is part of the proposed PES project site land, as a registered community may reserve special purpose areas as farming areas and use these areas exclusively for farming.[91] It could also be in the course of sustainable management of public forests and national parks for wildlife protection.

While the legal and regulatory framework does not limit the establishment of such a PES between a willing buyer and seller, the framework contains certain provisions that regulate the nature of activities that can be carried out and would need to be considered in PES project activity design. For example:

- The Pest Control Products Act regulates the importation, exportation, manufacture, distribution, and use of products used for the control of pests and of the organic function of plants and animals and for connected purposes.[92] Any PES project advancing the use of particular pest control products would need to ensure that the products are those allowed for use in the country as per the Act.

[87] *ibid*, section 32
[88] *Ibid*, section 32
[89] UN (2012), 'The Role and Contribution of Montane Forests and Related Ecosystem Services to the Kenyan Economy'; Yaw (2006), 'Effects of microclimatic changes caused by deforestation on the survivorship and reproductive fitness of anopheles gambiae in western Kenya highlands'.
[90] *See* Chyulu Hills Baseline Report, 53.
[91] Community Land Act, Section 29 (1)
[92] *ibid*, section 35(4)

- Any breeding or promotion of particular crop varieties or livestock breeds that are pest and disease tolerant would need to ensure that the breeding and promotion is in accordance with relevant laws, such as the Seeds and Plant Varieties Activities Act which regulates transactions in seeds, including provision for the testing and certification of seeds; and empowers the imposition of restriction on the introduction of new varieties.[93]

- The provisions of the Animal Diseases Act may apply to control the management of animal diseases such as where the Director of Veterinary Services prohibits the use of a particular vaccine or drug for the treatment of animal disease in Kenya, in which case the project needs to be structured noting these requirements.[94]

While data is not available regarding whether the REDD+ project would result in disease and pest control benefits for a broad set of diseases and pests, conservation activities at the Chyulu Hills are expected to reduce incidences of malaria; therefore, the significant value that malaria reduction provides may be included as an ecosystem service.

4.5.6 TOURISM

A voluntary tourism PES promoting ecotourism with activities including maintenance of wildlife habitats and cultural sites for recreation, and co-existence of wildlife with neighbouring populations,[95] is a viable option in Chyulu Hills. The ecosystem services that would be paid for include wildlife habitat and pristine landscapes, and the law does not impede a willing buyer and seller from entering into agreement to maintain these ecosystem services.

Regulation of wildlife is however 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.[96] This principle aligns with the goals of PES ensuring that public, private, and community landowners can each benefit from wildlife conservation.

The WCMA established the 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.[97]

The WCMA allows the establishment of Community Wildlife Associations (CWAs) which are communities, landowners, groups of landowners, and existing representative organisations established and registered under appropriate law. They facilitate conflict resolution and cooperative management of wildlife within a specified geographic region or sub-region.[98] Once established as an association (which requires approval by the Cabinet Secretary following recommendation by the KWS in consultation with the county wildlife conservation committees), a CWA is permitted to carry out a variety of functions including the acts necessary to enhance community participation in wildlife protection, conservation, and management.[99] Given the wide role, there is scope for CWAs to be involved in a PES focused on tourism should such an entity exist in the project site, and be involved in

[93] Cap 326, Laws of Kenya
[94] Cap 364, Laws of Kenya
[95] Langat D., et al, *Guidelines for Establishing Payment for Ecosystem Services Schemes in Kenya*, (KEFRI, 2017).
[96] WCMA, Section 4 (e).
[97] *Ibid*, Section 7 (a) and (f), respectively.
[98] *Ibid,* Section 40 (1) and (2)
[99] *Ibid,* Section 41

carrying out PES activities.

Where the activities are implemented outside the protected areas, for example requiring the setting aside of land to ensure the proximity and connectivity of wildlife habitats, dispersal areas, and migratory corridors outside the protected areas, the landowners will enter into PES agreements in accordance with the laws of the land tenure system they fall under.[100] In the case of community land, the Community Land Act, 2016 will be applicable. The Community Land Act also implicitly encourages tourism focused PES on community land, as it allows the designation of certain community lands as conservation areas, as well as cultural and religious sites.[101] This designation could be leveraged to enhance a tourism PES in these areas.

Because the proposed PES is located in a gazetted wildlife protection area (i.e. the Chyulu Hills National Park and the Tsavo West National Park), involvement and approval of the KWS will be necessary because the existing consent extends only to the carbon sequestration benefits of the REDD+ project.

4.5.7 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,[102] sets out the promotion of fair and equitable sharing of benefits accruing from utilisation of biodiversity and ecosystem services amongst its goals. The plan aims 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.

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. It is focused on ensuring the species in question's regeneration and maximum sustainable yield.[103]

A PES project focused on biodiversity may be based on payments for the protection of key habitats that encourage breeding populations of diverse flora and fauna.[104] PES projects on biodiversity in Kenya may also be focused on wildlife programmes as exemplified below:

- Wildlife Lease Programme (WLP) – a PES programme in which pastoral landowners in the Athi-Kaputie Plains (AKP), south of the Nairobi National Park, were paid an equivalent of $10 per hectare annually in return for managing land for wildlife and livestock grazing and to avoid fencing, quarrying, crop cultivation, sale, or sub-division of land. The programme which targeted

[100] Osano P. et al, "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).
[101] Community Land Act, Section 29 (1).
[102] Government of Kenya, Kenya National Biodiversity Strategy and Action Plan 2019 – 2030, (GoK, 2019).
[103] Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, and Access to Genetic Resources and Benefits Sharing) Regulations, 2006, regulation 5 (1).
[104] Langat D., et al, *Guidelines for Establishing Payment for Ecosystem Services Schemes in Kenya*, (KEFRI, 2017).

an area of 24,000 hectares ran from 2000 until 2012. The programme disbursed an estimated $1.3 million (at the exchange rate of 2005) to a total of 417 landowners during this period. The WLP followed a 'publicly funded' model because the money used to pay the landowners enrolled in the programme was provided by the World Bank through the Global Environment Facility, the Government of Kenya through the KWS, and NGOs that support conservation such as The Nature Conservancy.

- The Olare Orok Conservancy (OOC) – a PES programme whereby pastoral landowners living adjacent to the Maasai Mara National Reserve (hereafter 'the Mara Reserve') are paid $41 (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 programme 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 programme disbursed a total of $426,400 which was paid to the 217 participating households translating to an annual average of $2,000 per family. The OOC follows a 'user financed' model because the money used to pay the landowners enrolled in the programme comes from private sector companies involved in the wildlife tourism industry.[105]

Regulation of wildlife is guided by the WCMA, 2013. One of the general principles of the WCMA is that the 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.[106] As outlined in the Tourism section above, the WCMA established 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.[107] As the current REDD+ project site includes a gazetted wildlife protection area, the involvement and approval of the KWS will be necessary.

The current REDD+ project site includes the Kibwezi public forest and the REDD+ activities ongoing in the forest encourage wild species diversity. To establish a voluntary biodiversity PES, the involvement and approval of KFS will be necessary. KFS is represented in CHCT and a biodiversity PES may be established under the current REDD+ project structure, provided KFS consents to involvement in the proposed project and the transfer of its rights to biodiversity ecosystem services.

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.[108] To support conservation of biodiversity efforts, this agreement may allow or refrain the land user from using a forest and its products (subject to the agreement stating so); it should also contain details of the modalities of payment of compensation to such person for any loss incurred.[109]

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

[105] Osano P. et al, "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).
[106] Section 4 (e), WCMA.
[107] Section 7 (a) and (f), respectively, WCMA.
[108] Section 41 (1), FCMA.
[109] Section 41 (2), FCMA.

taken in biodiversity conservation. It is unclear if the REDD+ project has a conservation agreement in place at this time, but should KFS as the forest owner have entered into a joint management agreement with another party (such as a CFA), a conservation agreement is a viable arrangement under which to structure a PES scheme.

4.6 Summary of the legal analysis

While Kenya does not have an overarching legal or regulatory framework setting out the modalities of how a PES scheme should work/be set up, the 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 above.

As modelled under the structure highlighted in this analysis, there are no impediments to a voluntary PES for the different ecosystem services provided in the REDD+ project area set out above. The mechanism already in place for the flow of payments for carbon credits from the REDD+ project may be used to channel finance flows for the PES scheme.

As this analysis has highlighted, 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 existing CFAs, WRUAs and CWAs in the REDD+ project area are represented in CHCT, and this will need to be clarified. It is ideal that, where these community entities exist in the Project area, they are involved in the proposed Chyulu Hills PES scheme, as the entities would be useful for collaborative management of ecosystem resources at the project site. Nonetheless, the PES scheme may be structured with the current CHCT membership as-is, provided current CHCT members are involved in the REDD+ project activities that yield the desired ecosystem services.

In order to legally transfer the ecosystem benefits, the project entities represented in CHCT (KWS, KFS, Group Ranches Rombo, Kuku, Kuku A, and Mbirikani, Big Life Foundation, and the Sheldrick Wildlife Trust) will need to provide consent to allow PES buyers to claim benefits related to water regulation, water quality regulation, hazard regulation, disease and pest control, tourism, and biodiversity. The approvals currently in place are only for carbon storage activities in the REDD+ project area. As the proposed PES would be introducing new PES benefits, there is need for informed consent from the ecosystem service providers (sellers) to ensure the PES scheme is viable and their representation in CHCT is valid for the PES scheme. It would also need to be confirmed that the entity holding the PES assets (e.g. CHCT) is able to legally do so (i.e. it holds valid registration as a trust that enables it to hold the benefits and enter into contracts).

Lastly, it is recommended that climate regulation benefits be excluded from the PES scheme. Carbon credits sold by the REDD+ project provide an exclusive, legal right to carbon credit holders to claim the benefit of the carbon reductions represented by the carbon credits. The right to carbon from the same activities at the REDD+ project site could not be transferred to the PES buyers as well, as the sellers have already transferred that right in the carbon credit. 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. It is also noted that additional research is needed to consider the extent to which the REDD+ project's certification under the CCB would impact the ability to transfer rights to the other ecosystem benefits contemplated in this analysis.

5. Chapter 5: PES Principles

The aim of this chapter is to set out a revised structure for the Chyulu Hills PES scheme given the feedback on the baseline report and the additional financial and legal analysis included in this report.

5.1 Revised structure of the proposed Chyulu Hills PES scheme

The baseline report proposed a PES scheme that sits alongside the existing REDD+ scheme with the aim of raising additional revenues for the protection of the Chyulu Hills ecosystem through a fee per unit of water abstracted from the Mzima Springs pipeline. Money raised from the water fee would be collected by CWSB and passed on to CHCT to be distributed through the existing funding mechanism developed for the REDD+ scheme. An initial charge of around $0.10 per m^3 was proposed. In this way, the PES scheme would provide a sustainable source of finance to complement the income received by CHCT from other funding sources such as philanthropic sources, ecotourism, and carbon markets.

Once this structure was presented to key stakeholders, several challenges were raised:

- Limitations to the evidence around the relationship between forest cover and water supplies at the Mzima Springs.
- Economic constraints within Mombasa making the proposed water fee unlikely to be feasible.
- Clarification over the legal basis of the scheme if it provides benefits beyond water supply.
- A need for integrating with the proposed Mombasa Water Fund to avoid duplication of funding mechanisms and the risk of charging the same buyers more than once.

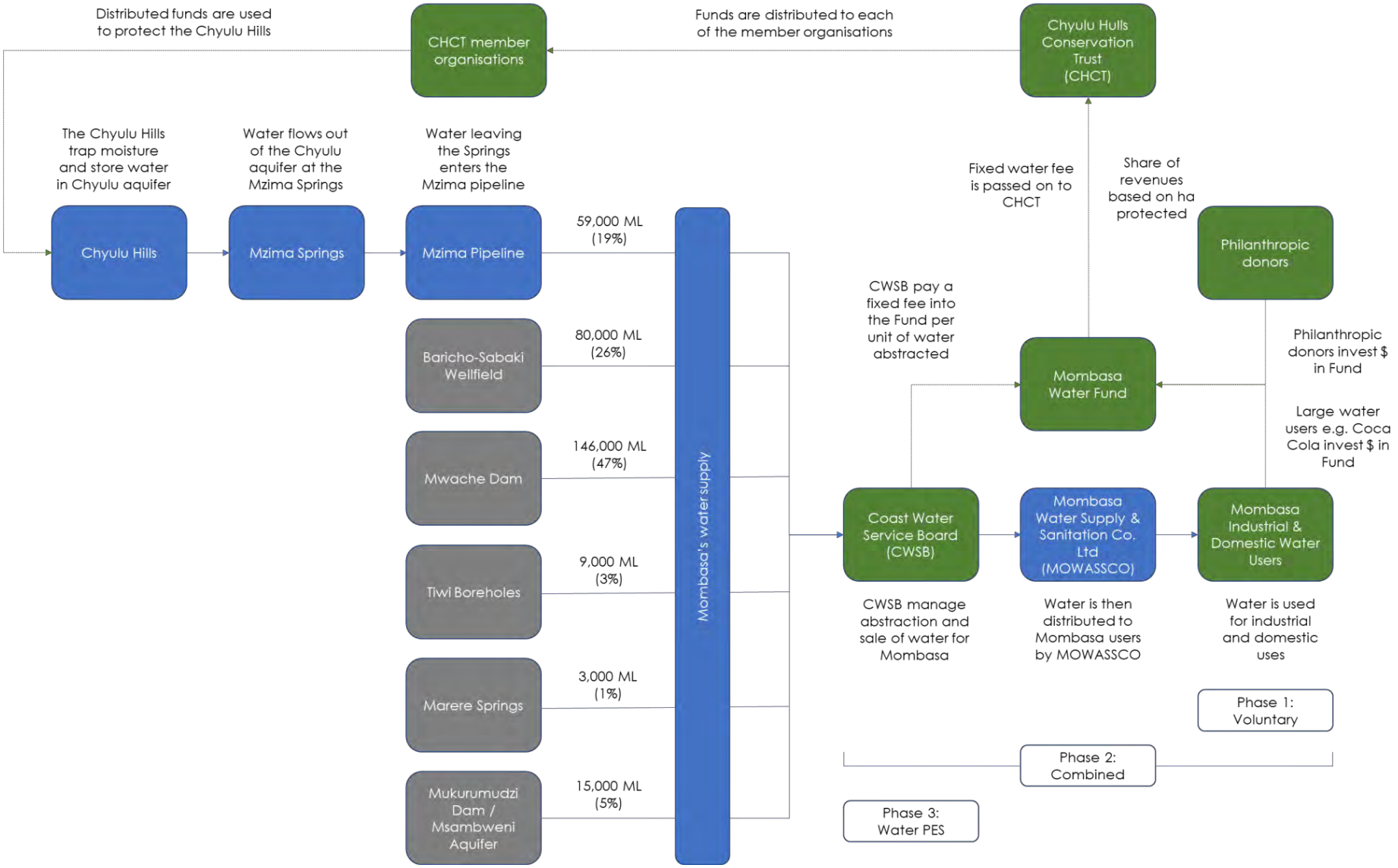
In light of these challenges, a revised structure for the scheme is proposed in the diagram overleaf. This revised structure suggests that:

- The Chyulu Hills PES scheme would sit alongside the REDD+ scheme as presented in the original scheme.
- In the short term, the scheme would focus on securing voluntary payments for the range of non-carbon ecosystem services provided by the Chyulu Hills' forests (e.g. water supply, water quality regulation, hazard regulation, disease and pest control, tourism, and biodiversity).
- The target buyers would be large, industrial water users in Mombasa as well as other ecosystem service beneficiaries such as philanthropists, international donors, tourism organisations, and NGOs with an interest in protecting the area.
- The PES scheme would be integrated within the broader Mombasa Water Fund such that all funds would be raised through the central Mombasa Water Fund mechanism. These funds would then be passed on to CHCT to manage protection of the overlapping aquifer recharge area and the REDD+ project area and reduce deforestation, protect biodiversity, and deliver community benefits through the existing governance and financial management structures. While these funds would be voluntary, there would be a target of raising around $24 for each ha of forest protected. It is estimated that the annual benefits of such protection would amount to around $638 per ha.
- Over the longer term there would be a shift towards establishing a more market-focused PES scheme such as that proposed in the baseline report whereby buyers pay a unit fee for the water supplied to them from the Mzima Springs. The imposition of this fee would be supported by a

range of factors including: developing the evidence base around the links between forest cover and water supplies; increasing economic growth in Mombasa making the proposed fee more economically acceptable; growing experience of the benefits provided by the PES scheme; building up trust though the Mombasa Water Fund mechanism; and bringing on line the new second pipeline at the Mzima Springs to enable a reduction in the fee per unit of water abstracted. The aim would be to transition from a voluntary system to a fully market based system, with water users paying around $0.10 per m^3 in 2031. The fees would be paid into the Mombasa Water Fund and passed on to CHCT to be managed and disbursed through the existing REDD+ mechanism.

A diagrammatic overview of the revised PES scheme is set out in Figure 5.1 below.

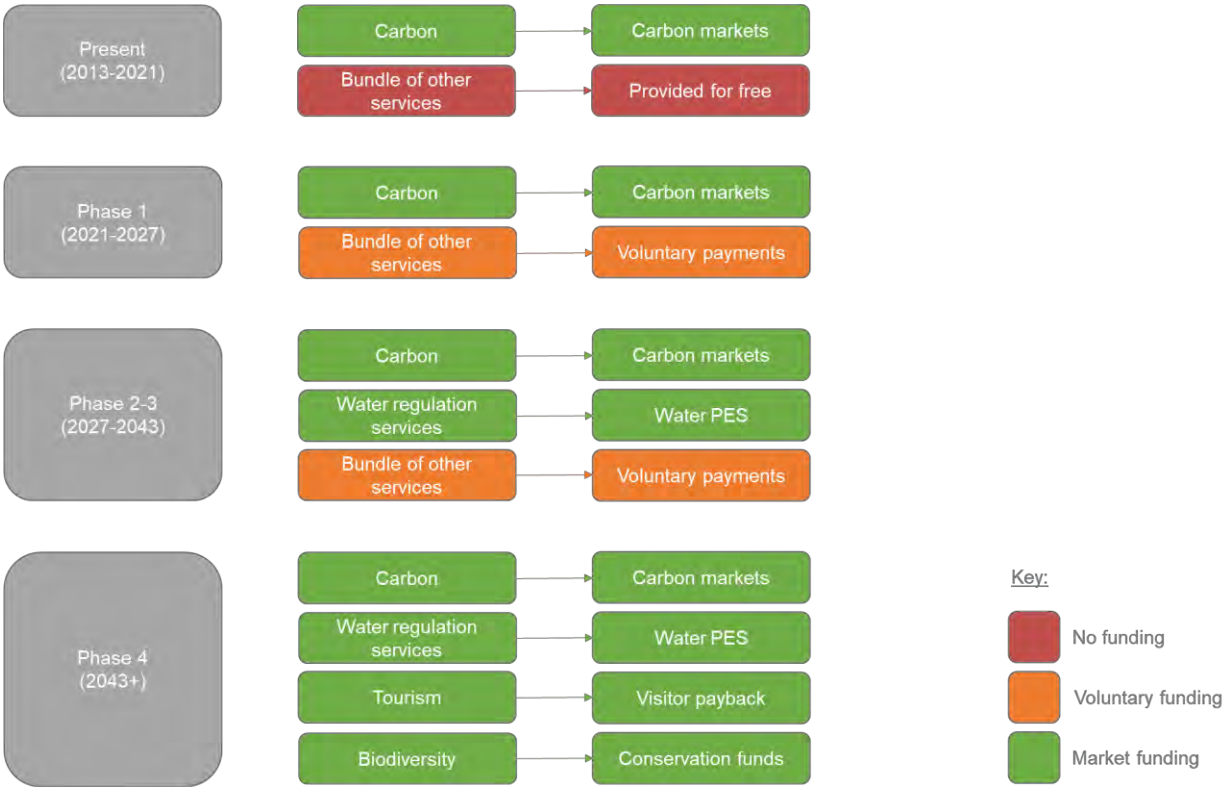
Figure 5.1 Overview of the revised Chyulu Hills PES scheme structure



Source: AECOM, 2021

Over the longer term, particularly in the 2040s when the REDD+ scheme is no longer operational, a fourth phase of the scheme could be launched. This phase could further develop the model of transitioning from paying for a bundle of services towards individually layered schemes for specific ecosystem services (i.e. carbon and water regulation) to explore the potential for setting up separate financial arrangements for the other ecosystem services provided by the Chyulu Hills region such as tourism and biodiversity (see Figure 5.2).

Figure 5.2 Longer term opportunity to transition to a multi-layered PES scheme in the Chyulu Hills



Source: AECOM, 2021

5.2 Details of the proposed Chyulu Hills PES scheme

In order to provide more detail on the specific elements of the revised Chyulu Hills PES scheme, an overview of the structure is set out in Table 5.1 below.

Table 5.1 Details of the revised Chyulu Hills PES scheme

Element of scheme	Details
Objectives:	To establish a PES scheme that provides a sustainable source of finance to complement the existing REDD+ project in the Chyulu Hills and helps to prevent deforestation in order to secure the ongoing provision of ecosystem services, including critically important water regulation services. The scheme will begin by focusing on voluntary payments for the bundle of non-carbon services provided by the Chyulu Hills' forests before transitioning to a system of fixed payments for each unit of water abstracted from the Mzima Springs. In the longer term additional services could also be marketed to create a multi-layered PES scheme.

Element of scheme	Details
Ecosystem services:	Non-timber forest products, water supply, water quality regulation, hazard regulation, disease and pest control, tourism, and biodiversity
Environmental co-benefits:	There is an existing REDD+ scheme in the Chyulu Hills through which carbon credits are verified and traded. The two schemes have complementary aims and the proposal is to set the Chyulu Hills PES scheme up alongside the existing REDD+ scheme forming a layered scheme where different buyers purchase different services i.e. buyers on the international carbon market purchase carbon while water users in Mombasa purchase water and other ecosystem services. The Chyulu Hills PES scheme would therefore provide an additional source of funds to help this scheme manage the area and protect the forests.
Social co-benefits:	The existing REDD+ scheme provides social co-benefits in terms of investment in the area, jobs, and alternative sources of income. The Chyulu Hills PES scheme would increase the capacity of the REDD+ scheme to deliver these benefits. The finances raised through the PES scheme would be delivered through the already established benefit allocation and sharing mechanism set up for the REDD+ project.
Potential buyers:	The key buyers in the initial stages are expected to be large industrial water users in Mombasa and philanthropic donors with an interest in the Chyulu Hills ecosystem. As the scheme transitions it is anticipated that the main buyer will be the Mombasa Water Supply & Sanitation Company (MOWASSCO). It is proposed that MOWASSCO will pay an additional water use fee to the Coast Water Services Board (CWSB) who manage the Mzima Springs pipeline and abstractions from it. MOWASSCO would then pass on this fee to domestic and industrial water users in Mombasa.
Sellers	The sellers would be the local communities living within the Chyulu Hills, together with local conservation and Government organisations responsible for managing the protected areas i.e. the nine trustee partners of the CHCT. These organisations are currently engaged in the generation and sale of carbon credits through the existing REDD+ scheme. In this scheme sellers are aggregated and represented by CHCT which meets on a regular basis to discuss and agree how funds raised through carbon credit sales will be allocated. CHCT currently has representatives from the following organisations: KWS; KFS; MWCT; Group Ranches Rombo, Kuku, Kuku A, and Mbirkani; Big Life Foundation, and the Sheldrick Wildlife Trust. Funds raised through the sale of carbon credits are divided between these organisations according to an agreed process / benefits sharing arrangement.
Intermediaries	The principal intermediaries would be expected to include MWCT which would act as Project Office for CHCT in terms of coordinating project activities, financial management, and administrative support as they do for the REDD+ scheme; and The Nature Conservancy which is designing and implementing the Mombasa Water Fund, and would provide the main architecture for buyers to interact with.
Knowledge providers	There are several key knowledge providers that have been involved in the design of the Chyulu Hills PES scheme to date: AECOM is providing technical research and management expertise; CPI is providing expertise related to financing ecosystem services; Pollination and Kieti Advocates are providing legal analysis and advice; AmbioTEK is providing hydrological modelling; and The Nature Conservancy is providing expertise in relation to the creation and management of water funds.
Geographical scale	The scale of the project aligns with that in the existing Chyulu Hills REDD+ scheme which covers a total of 410,534 ha.

Element of scheme	Details
Interventions	The interventions funded through the Chyulu Hills PES scheme would focus on those which aim to further protect the Chyulu Hills ecosystem and align with those of the REDD+ scheme. These involve: enhancing and strengthening landscape protection; improving livestock management practices; employing forest rangers; bolstering employee motivation; creating alternative income, and employment opportunities; supporting stricter environmental law enforcement; helping to address food security; improving health and education facilities; raising environmental awareness; improving biodiversity monitoring; and bolstering wildlife-compensation schemes.
Quantification of services	Initial quantification of the non-carbon ecosystem services provided by the forests of the Chyulu Hills has been undertaken in the baseline report. The figures suggest that these services could be significant and worth up to $638 per ha. However, these calculations are based on a desktop review, not primary research. In order to provide more detailed estimates, it is proposed that a digital natural capital account is created for the Chyulu Hills which would define key metrics (e.g. units of water provided, area of forest protected, population of key species), and report at regular intervals to provide a more detailed demonstration of the benefits provided and build up the evidence base for the future structure of the PES scheme. To support this a baseline account has been prepared which can be accessed here: https://planengageuk.alytics.com/unpublished/chyulu-hills-dnca/home - DNCA. Note, carbon benefits will be quantified separately as required under the REDD+ project requirements and reported alongside other ecosystem service benefits.
Type of payment	In the first instance payments would be made on a voluntary basis through the Mombasa Water Fund to protect the forest and the bundle of services provided, aiming to secure around $24 per ha. Over the longer term the aim is that payments would be made by MOWASSCO to CWSB for each unit of water abstracted from the Mzima Springs pipeline. The revenues raised through these payments would be passed on to the Mombasa Water Fund and from that allocated to CHCT. These funds would then be allocated through the existing governance structure in place for the REDD+ scheme.
Contractual format	Following completion and dissemination of this workstream, the next stage will be to further develop the overarching architecture of the Mombasa Water Fund, and the role of the Chyulu Hills PES scheme within it, which will provide the main vehicle for manging contracts and payments between participants.
Approach to monitoring	As part of the final stages of work for this project, a digital natural capital accounting platform has been developed to provide an evidence basis for monitoring the impacts, and facilitating adaptive management of the Chyulu Hills PES scheme. It is expected that the account will be updated at regular intervals in future to provide a clear evidence base on the impacts of the scheme.

Source: AECOM, 2021

5.3 Risks facing the proposed Chyulu Hills PES scheme

An overview of key risks to the scheme and associated mitigation options is set out in Table 5.2. Each of the potential risks was categorised as follows:

- Critical – addressing the risk is essential at this stage of the project to determine whether the scheme is likely to be viable in its current design.
- High – addressing the risk is essential at some point in the project as the scheme is unlikely to viable without the risk being mitigated.
- Medium – addressing the risk is important at some point in the project as it could provide a significant hurdle to the scheme's development.
- Low – risk unlikely to create a significant hurdle to the scheme's development so does not have to be addressed further.

Table 5.2 Risks and mitigation for the proposed Chyulu Hills Chyulu Hills PES scheme

Risk factor	Risk level	Mitigation measures
Legal and regulatory issues may preclude the scheme's development	Critical	Developing an understanding of the legal and regulatory requirements the scheme must satisfy is critical to its success. As such, a legal and regulatory analysis has been undertaken to determine the necessary approvals and legal framework that could support the Chyulu Hills PES scheme. The development of a national PES framework, which is ongoing, could also influence the development of the scheme. The findings are set out in Chapter 4 of this report. In summary, in the short term there are no legal impediments to setting up a voluntary PES for the different ecosystem services provided by the Chyulu Hills. The mechanism already in place for the flow of payments for carbon credits from the REDD+ project may be used to channel finance flows for the PES scheme. Importantly, carbon must be excluded from the PES scheme to avoid double counting with the REDD+ project. Over the longer term, the caveats highlighted in the baseline report around the need for CHCT (or even The Nature Conservancy or the Mombasa Water Fund organisational body) to be designated as a revenue collector by the WRA need to be addressed. It is also important to note that it could be worth exploring the possibility of extending the make-up of the CHCT partnership to include representatives from any relevant CFAs, WRUAs, or CWAs.
Lack of a solid evidence base to clearly establish the rationale for a PES scheme	Critical	Developing a solid evidence base to underpin the proposed scheme is critical to its success. Initial desk-based work has been undertaken to develop a financial case for the Chyulu Hills PES scheme. The results of this are set out in Chapter 3 of this report. From the analysis undertaken there is clearly a financial need for the scheme. However, there remains a challenge in convincing buyers of the need to invest in the scheme in return for the continued provision of ecosystem services, something which should be a priority in terms of future development of the PES scheme and wider Mombasa Water Fund.
Insufficient demand and/or high transaction costs meaning that the costs of the activities required to protect the forest resource exceed the revenues generated by the PES scheme	High	A high-level assessment of the potential demand for the scheme was undertaken in the baseline report. Due to COVID-19 restrictions and a need to avoid overlapping with consultation work undertaken at the same time for the Mombasa Water Fund, it was not possible to directly engage with potential buyers about engaging in the PES scheme. The results of the financial analysis undertaken in this report suggest that there is an opportunity to integrate with the Mombasa Water Fund and focus, in the initial stages, on seeking voluntary donations for the bundle of ecosystem services provided. Then, as the scheme progresses, build up capacity and interest amongst buyers in terms of signing up to a unit water pricing structure over the longer term.

Risk factor	Risk level	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)	High	Ensuring the PES payments support activities that contribute to activities that are not already being undertaken is important to demonstrate additionality and system credibility. This is a high potential risk given that this scheme is proposed to sit alongside the existing REDD+ scheme. The financial analysis for the Chyulu Hills PES scheme undertaken in this report suggests there is a clear financial need for additional funding sources to help meet the aims of the REDD+ project, and that without such funding in place, it will be challenging to halt deforestation in the Chyulu Hills. This is something that has been echoed in the literature around the financial case for carbon schemes around the world. It is also of note that the unpredictability and uncertainty associated with the voluntary carbon market means that long term budget planning is challenging in the Chyulu Hills and a more consistent form of finance is required. One important caveat is to note that carbon should not be included in the PES scheme to avoid issues around buyers paying for the same services more than once.
Perception of the scheme being seen as unfair amongst certain stakeholder groups	Medium	Perceptions of unfairness from both buyers and sellers, as well as groups outside of the scheme which consider themselves affected (e.g. communities living to the east of the PES Project Area), could undermine the scheme's effectiveness. Engagement with these stakeholders should be undertaken to discuss these issues further.
Unexpected events which may undermine the agreed interventions such as wildfire, drought, or invasive species destroying planted areas	Medium	There are measures within the existing REDD+ scheme to deal with unexpected events. However, a risk that could be specific to the Chyulu Hills PES scheme includes unexpected factors which lead to declines in water flows or changes in flood risks, even if forests are protected in the area (e.g. changing weather patterns as a result of climate change). This will need to be explored through discussions with stakeholders and careful monitoring and communication of the impacts of the project.
Failure to raise sufficient upfront capital to initiate the PES scheme	Medium	Funding to develop the PES scheme is being provided by IKI through the GNI^plus project. However, this funding ends in 2022 and there may need to be further investments to continue to develop the scheme depending on the level of progress achieved by this project. A key opportunity lies in integration with the Mombasa Water Fund and sharing of the capital costs across the schemes.
Displacement of food production undermining food security in the area	Low	This is unlikely to be a significant risk given that a core aim of the existing REDD+ scheme is to help address food security issues in order to reduce encroachment within the forested areas.
Insufficient institutional capacity or resources to implement, monitor and evaluate the scheme	Low	This is unlikely to be a significant risk given that there is already a monitoring and evaluation programme in place for the REDD+ scheme. Future work should look to develop a monitoring plan which integrates considerations relating to the Chyulu Hills PES scheme (i.e. water flow monitoring).

Risk factor	Risk level	Mitigation measures
Lack of clarity over land rights and ownership of the services provided by forests such as water regulation	Low	In terms of land this is unlikely to be a significant risk given the current status of the existing REDD+ scheme and the involvement of all the major landowners within the area in the scheme's governance structure. It could be worth looking into extending the make-up of the CHCT partnership to include representatives from any relevant CFAs, WRUAs, or CWAs.
Lack of legitimacy of the scheme leading to poor engagement with local communities	Low	This is unlikely to be a significant risk given the level of involvement of local communities in the existing REDD+ scheme. The subsequent stages of this project will aim to discuss the proposed Chyulu Hills PES scheme and incorporate suggestions from local communities to make sure that it meets their needs.
Potential unforeseen negative impacts that may arise such as increases in income inequality, issues of power imbalance, and gender issues	Low	This is unlikely to be a significant risk given the governance structures set up within the existing REDD+ scheme.
Increased pressure on ecosystem services elsewhere (i.e. leakage)	Low	A common risk associated with PES schemes is that securing an ecosystem service in one location leads to the loss or degradation of ecosystem services elsewhere. In the Chyulu Hills this is unlikely to be a significant risk given the measures in place to address this issue within the REDD+ scheme. These measures include a specific leakage mitigation plan covering training, employment of rangers, creation of tree nurseries, education, alternative income-generation schemes, micro finance schemes, and an eco-charcoal project.
Challenges of aggregating geographically dispersed farmers	Low	This is unlikely to be a significant risk given the role that CHCT currently plays in aggregating individuals within the area under the current REDD+ scheme.
Trade-offs between services or objectives of the PES scheme	Low	This is unlikely to be a significant risk given the complementarity between the goals of the REDD+ and Chyulu Hills PES schemes in terms of securing forest protection within the area.
Increased loss of crops due to human-wildlife conflict	Low	This is unlikely to be a significant risk given the measures set up within the existing REDD+ scheme to address this risk around supporting wildlife compensation schemes.

Source: AECOM, 2021

5.4 Summary of the PES principles

The Chyulu Hills provides a range of important ecosystem services, including a valuable water supply to users in Mombasa. However, the land managers who are 'providing' these services do not receive the benefits accruing from their provision . It is proposed that a PES scheme could address this issue in the Chyulu Hills.

The aim of the proposed Chyulu Hills PES scheme would be to sit alongside the existing REDD+ scheme and raise additional revenues for the protection of the Chyulu Hills forests, beginning with a voluntary payment for the bundle of services provided by forests through securing contributions via the Mombasa Water Fund from large water users and other interested parties, before moving towards a unit fee system over time where water users pay a specific fee for each unit of water abstracted from the Mzima Springs.

6. Chapter 6: Conclusions and Recommendations

This document provides an update to the baseline report prepared for the Chyulu Hills PES scheme and builds on the issues raised from feedback on the report. This final chapter summarises the conclusions of the analysis and provides a set of recommendations for potential next steps.

6.1 Conclusions

The aim of this project is for GNI^plus to work with the Chyulu Hills Conservation Trust (CHCT), a consortium of nine local stakeholder organisations[110] and the Maasai Wilderness Conservation Trust (MWCT) who act as 'Project Office' for the REDD+ project, to help design and implement a PES scheme in the Chyulu Hills which would serve to maintain downstream water supplies through the preservation of forests.

The baseline report, and the feedback received on the report, identified several challenges that need to be addressed by the Chyulu Hills PES scheme:

- Developing the evidence base around the role of forests in protecting water supplies.
- Establishing the financial case for the scheme.
- Clarifying the legal basis of a potential PES scheme.
- Integrating with other schemes in the area, particularly the proposed Mombasa Water Fund.

In light of these proposed challenges, a revised structure for the scheme is proposed as follows:

- The Chyulu Hills PES scheme would sit alongside the existing REDD+ scheme.
- In the short term, the scheme would focus on securing voluntary payments for the range of non-carbon ecosystem services provided by the Chyulu Hills' forests (e.g. water supply, water quality regulation, hazard regulation, disease and pest control, tourism, and biodiversity).
- The target buyers would be large, industrial water users in Mombasa as well as other ecosystem service beneficiaries such as international donors, tourism organisations, and NGOs with an interest in protecting the area.
- The PES scheme would be integrated within the broader Mombasa Water Fund such that all funds would be raised through the central Mombasa Water Fund mechanism. These funds would then be passed on to CHCT to manage the REDD+ project area and prevent deforestation through the existing governance arrangement. While these funds would be voluntary, there would be a target of raising around $24 for each ha protected under the scheme. It is estimated that the annual benefits of such protection would amount to around $638 per ha.
- Over the longer term there would be a shift towards establishing a more market-focused PES scheme whereby buyers pay a unit fee for the water supplied from the Mzima Springs. The imposition of this fee would be supported by a range of factors including: developing the evidence base around the links between forest cover and water supplies; increasing economic growth in Mombasa making the proposed fee more financially acceptable; growing experience of the benefits provided by the PES scheme; building trust though the Mombasa Water Fund

[110] Kenya Wildlife Service (KWS), Kenya Forest Service (KFS), Maasai Wilderness Conservation Trust (MWCT), Big Life Foundation, Sheldrick Wildlife Trust, and Group Ranches Rombo, Kuku, Kuku A, and Mbirkani.

mechanism; and bringing on line the second pipeline at the Mzima Springs to enable a reduction in the fee per unit of water abstracted. The aim would be to transition from a voluntary to a fully market-based scheme, with water users paying around $0.10 per m^3 in 2031 when the second pipeline comes on line. The fees would be paid into the Mombasa Water Fund and passed on to CHCT to be disbursed through the existing REDD+ mechanism.

Over the longer term, particularly in the 2040s when the REDD+ scheme is no longer operational, a fourth phase of the scheme could be launched. This phase could further develop the model of transitioning from paying for a bundle of services towards individually layered schemes for specific ecosystem services (i.e. carbon and water regulation), to explore the potential for setting up separate financial arrangements for the other ecosystem services provided by the Chyulu Hills region such as tourism and biodiversity.

The opportunity with this approach is that it allows for a broad, flexible approach to securing funding in the early stages of the scheme, when data on the impacts of forest cover on ecosystem service provision are limited and financial constraints are high. This voluntary approach is simpler and easier to set up than a fully-functioning water market and allows the scheme to target a broad range of potential buyers that may be interested in investing, although in the long term it may struggle in terms of sustaining the required level of financing given that it relies on voluntary donations.

As further data is collected, users are familiarised with the concept of PES, the amount of water being abstracted from Mzima Springs increases, and a solid business case can be developed to clearly identify the benefits to water users of protecting the Chyulu Hills, the approach allows for a transition away from a system of voluntary donations towards a fully functioning market whereby water users pay for the benefits provided by protecting the Chyulu Hills ecosystem. The development of such a market is complex and will require solid data and trust built up between all sides, however, it offers the opportunity to secure a long-term approach to the financing problem facing the Chyulu Hills, as the users of the services are paying to protect the long term provision of those services, ultimately out of their own financial interest.

In the short term there are no legal impediments to setting up a voluntary PES scheme for the different ecosystem services provided by the Chyulu Hills. The mechanism already in place for the flow of payments for carbon credits from the REDD+ project may be used to channel finance flows for the PES scheme. Although it is important to exclude carbon from the PES scheme to avoid double counting with the REDD+ project.

Over the longer term, there is a need for CHCT (or even The Nature Conservancy or the Mombasa Water Fund's organisational body) to be designated as a revenue collector by the Water Resources Authority to allow the collection of a unit water fee. As the scheme grows it could also be worth exploring the possibility of extending the make-up of the CHCT partnership to include representatives from any relevant organisations such as Community Forest Associations.

6.2 Recommendations

Based on the findings of this report, several potential next steps are outlined below (which could be pursued independently or in combination):

- Building on previous stakeholder engagement, the findings of this work could be presented to key stakeholders within the Chyulu Hills and Mombasa to garner further feedback and support for the project.

- Further conversations could be held with The Nature Conservancy to explore how the Chyulu Hills PES scheme could be integrated into the Mombasa Water Fund and pitched to investors at the launch of the fund.
- Additional work could be undertaken, as part of the development of the Mombasa Water Fund, to engage with potential buyers about the scheme and develop materials needed to support this.
- A monitoring plan could be set up whereby part of the funds raised through the PES scheme are allocated to gather data on the performance of the scheme in each year of its operation, as well as being used to develop a more detailed understanding of the hydrological system and the need for continuing payments. This could build on the baseline digital natural capital accounting platform developed for the Chyulu Hills as part of this project.

Design and Implementation of a Payment for Ecosystem Services Scheme in the Chyulu Hills: PES Scheme Principles

Appendices

Appendix A. Summary of laws and policies relevant to PES in Kenya

A.1 Overview

This Appendix provides an overview of the key laws and policies relevant to PES in Kenya. It is divided into the following sections:

- Laws and policies that directly mention PES.
- Laws and policies that implicitly support PES without direct mention of the term.

A.2 Laws and policies that directly mention PES

A.2.1 EXISTING LAWS AND POLICIES

The existing laws and policies in Kenya that specifically mention PES include:

- Kenya Water Towers Agency Order, 2012: the Order 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: the National Environment Policy 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: the policy 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 (FCMA), 2016: the Act 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 KFS and a CFA.
- Green Economy Strategy and Implementation Plan (GESIP)– Kenya (2016-2030): under Objective 3.1, which seeks to promote the application of market-based instruments and entrepreneurship in natural resource management, GESIP 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. For this objective, the Key Performance Indicators include the number of PES schemes established. It is undocumented the

extent to which this GESIP objective has been met in that time period.

- National Climate Change Action Plan (NCCAP) 2018-2022: under the NCCAP, 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 through ecosystem services and carbon markets. There has been no further information from the Government on how this NCCAP provision will be actualised.

- **Kenya's First Nationally Determined Contribution (Updated), 2020:** Kenya submitted its updated NDC on the 24th of December 2020 in accordance with the requirements of the Paris Agreement for Parties to the Convention to Communicate NDCs every five years. 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)"*. This inclusion in the updated NDC follows the *Mikoko Pamoja* ('Mangroves together') PES project based in Gazi Bay, Coastal Kenya supported by the Kenya Marine and Fisheries Research Institute. This is the first PES project in the world which seeks to restore and conserve mangroves, through the sale of carbon credits.

A.2.2 DRAFT LAWS AND POLICIES

The draft laws and policies that specifically mention PES include:

- Kenya Water Towers Bill, 2019: this is a draft law proposed to replace the Kenya Water Towers Authority Order, 2012, upon its enactment. It establishes the Kenya Water Towers Authority 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. Section 47 of the Bill reiterates this provision on the responsibility of the Cabinet Secretary to make regulations for PES. The Bill is currently under discussion.

- Sustainable Waste Management Bill, 2019: 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 Draft National Forest Policy, 2020: the draft national forest policy is currently under stakeholder review. It 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, either from the national Government or from development partners and international NGOs 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.

A.3 Laws and policies that implicitly support PES without direct mention of the term

The laws and policies that implicitly support PES without direct mention of the term include:

- 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 seek to align the water sector to the devolved governance system introduced by the Constitution of Kenya, 2010. These regulations allow a 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.