Journal of Resources Development and Management
ISSN 2422-8397 An International Peer-reviewed Journal
Vol.40, 2018

Payment for Environmental Services: Status and Opportunities in Kenya

Joram K. Kagombe[1] Joshua K. Cheboiwo[1*] Alfred Gichu[2] Collins Handa[3] Jane Wamboi[4]
1.Socioeconomic, Policy and Governance, Kenya Forestry Research Institute, P.O Box 20412-00200, Nairobi, Kenya
2.Head of Climate Change Response Programme and Coordinator of REDD+ activities, KFS, Karura
3. Senior Research Scientist, National Museums of Kenya, Botany Department
4.Senior Research Scientist, Kenya Wildlife Service

Abstracts
Payment for Ecosystem Service (PES) is a market driven tool to motivate upstream land owners to practices land uses that enhance water quantity flows through compensation incentive packages supported by downstream beneficiaries and partners. PES is a voluntary engagement that involves negotiation by sellers and buyers of ecosystem products and services through independent intermediaries. The country is facing high deforestation and degradation rates within the key watersheds that threaten future supply of water for various socioeconomic activities. The PES concept has been around for the last two decades and many projects have been undertaken in the country hence the need to evaluate its adoption rates and subsequent outcomes to inform future direction of research and investments in PES schemes in the country. A study was initiated by Kenya Forestry Research Institute (KEFRI) and partners in 2016 to collect information on the experiences by several projects in the implementation of PES schemes. This was informed by the fact that information and data on use of PES in watershed management in Kenya is scanty and disjointed hence the needs for comprehensive study to update stakeholders on its status and experiences. Similarly, the country has to manage its watersheds in accordance with international standards and hence needs to tap into the most effective approaches and technologies available within its socioeconomic and ecological contexts. The study results indicate that the country has put in place some policy and legal framework to support PES piloting schemes. The cross sector study identified 15 projects on carbon sequestration, biodiversity conservation, watershed protection and a bundled combination of these services that have been implemented in the country. PES schemes promoted conservation friendly land uses and offered a wide range of incentives to communities and individuals who are custodians of the natural resources through negotiated engagements. The PES schemes faced several challenges related to high population, smallholder farms, inadequate policy and legal frameworks and governance issues that tended to increase implementation costs and hinder effective participation. The opportunities include a wide range of conservation land uses such as contour terraces, tree planting, grass strips along rivers and differed or controlled grazing in drylands. PES schemes in most cases have provided significant benefits and income opportunities to local communities including increased agricultural incomes, social assets, employment and biodiversity conservation. The experience from pilot PES schemes provides practical lessons that can inform the future design and implementation of PES models within the context of the local situations. The agencies that have interest in forestry and other environment services should continue to pursue the path of PES mechanisms to address environmental degradation and diminishing environmental resources. This is premised on the fact that ES services directly and indirectly support socioeconomic development especially at local levels. However, there is need for some policy and legislative reforms to mainstream PES principles sectoral plans and conservation projects and was enhance enforcement of existing legislation and Acts
Keywords: payment for ecosystem services, experiences status, watersheds, income opportunities,

1.0 Introduction

Ecosystem services (ES) are the benefits that people get from ecosystems directly or indirectly. The Millennium Ecosystem Services 2005 identifies four ES categories that are of significant importance to households, communities and economies namely i) Provisioning services mostly products obtained directly from ecosystems such as food, fiber, and fresh water; ii) Regulating services are benefits obtained from the regulation of ecosystem processes that include climate, water, and human diseases; iii) Cultural services are non-material benefits such as spiritual enrichment, reflection, recreation, and aesthetic experience and iv) and, Supporting services that support other production activities such as biomass, oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitats.

The Payments for Ecosystem Services (PES) concept and practice revolve around offering incentives to communities, farmers or landowners in exchange for better management of their land and other natural resources for enhanced provision of environmental services. In order to enhance flow of ES many countries have experimented with various PES approaches that attempt develop viable mechanisms to align investments in human and natural resources. PES projects are premised on equitable principle based on voluntary transactions where well-defined ecosystem services are bought by a minimum of one service buyers, from a minimum of one service

provider. Furthermore, PES is conditioned by the principle of additionality of behaviour that would otherwise not occur without rewards. Under PES approach the party supplying the ES holds the property rights over the environmental good that provides a flow of benefits to the demanding party in return for compensation. Another critical component of PES is that the beneficiaries of the ES are willing to pay a negotiated price based on some scientific calculation and facts that is also acceptable to ES providers. In most cases the sellers of ES are land managers who are paid for specific land use practices that generate the desired ES outputs. PES schemes are increasingly being accepted as the most efficient means to achieve desired outcomes in forest and environment improvement worldwide.

In 2007, World Bank outlined the place of PES as a tool for rural development under the umbrella of poverty alleviation schemes. However, it is important to note that PES programmes are usually not designed primarily to address poverty but only some of its instruments form part of the overall economic development mechanisms. Voluntary PES schemes are market based tools that involve some contractual agreements between consumers of ecosystem services and the suppliers of these services. The market decision basis is commemorated through private contracts where the beneficiaries of the ecosystem services are willing to pay a price that is lower than their welfare gain due to the services. Similarly, the providers of the ecosystem services are willing to accept a payment that is greater than the cost of providing the services. However, the majority of the PES programs being implemented globally are funded by governments and international development agencies mostly through intermediaries such as public agencies and non-government organisations. Therefore most of these PES schemes fall into two categories the market based voluntary schemes and funded programmes.

Though the goal for PES programs is the procurement of ecosystem service, the reasons and modes organizations or governments promote provision of incentives for the production of these services globally are diverse. The United States of America (USA) has the longest running PES programme in the world, the Conservation Reserve Programme that pays about $1.8 billion to 766,000 contracted farmers and landowners for not farming a total 13,880,000 hectares or 140,000 km^2 of environmentally-sensitive land. The farmers are required to plant "long-term, resource-conserving covers to improve water quality, control soil erosion and enhance habitats for waterfowl and wildlife. It has existed in one form or another since the 1930 Dust Bowl. Secondly, China has emerged as an important player in PES schemes and currently runs one of the most ambitious and expensive project in the world standing since 1999 running to $43 billion the Grain for Green Programme. The project offers farmers grain in exchange for not clearing forested slopes for farming to reduce erosion and saving the streams and rivers below from of sedimentation. Many countries including Canada, EU members, Japan and Switzerland finance less expensive national projects. Some of the PES variants being implemented in developing countries that are more relevant to Kenya are located mostly in Asia and South America.

The implementation of PES schemes in Kenya has been slow because of many reasons key being inadequate expertise, structures, markets, proper pricing and market enforcement mechanisms. However, in recent years, many PES projects have been piloted in many parts of the country through contractual and conditional payments to land owners. The attraction of PES projects to countries and participants provides opportunities for forest-adjacent communities and other land owners to earn extra incomes while conserving their environment.

The papers examines past and current PES projects in the country to understand the categories, mode of implementation, experiences and lessons learnt to inform future decisions and designing of such projects in the country.

1.2 Methodology

Some desk literature reviews and consultation with many stakeholders in the country enabled assemblage and evaluation of selected pilot PES schemes.

2.0 Results on PES projects in Kenya

Cross country desktop study identified 15 projects on carbon sequestration, biodiversity conservation, watershed protection and a bundled combination of these services that have been implemented in the country. Market based voluntary PES scheme categories being piloted in the form of Rewards of Environmental Services (RES) include the Naivasha, Sasumua, Nyando and Kapingazi pilot schemes.

Country Preparedness

The country has put in place sectoral and multi-sectoral policies and laws though in many cases are not explicit on PES adoption but provide sufficient policy and legal framework for piloting phases to inform future reforms. Some of the instruments the Climate Readiness Strategy, 2012, Climate Change Act 2017, Forest Conservation and Management Act 2016 and National Environmental Management Act revised 2016. However, apart from policy and legal issues, the road to PES adoption in the country is still full of challenges that have to be surmounted. The challenges mostly relate to inadequate data and information to inform the process and address the underestimation of contribution of forestry and environmental sectors to the national economy.

Despite the challenges, some government agencies with support from partners have put in place temporary

structures and financial set ups to support pilot PES schemes in various forms across the country. In most cases the pilot PES schemes have been implemented with greater donor support mostly to enhance understanding of how it works before scaling out to the other categories and parts of the country.

2.2.0 Pilot PES Schemes in Kenya

2.2.1 Kapingazi River Restoration Project

The project is located along the Kapingazi River basin in Embu County initiated by the Mount Kenya East Pilot Project (MKEPP) and later taken up by Upper Tana Natural Resource Management Project (UTaNRMP). The major work is growing of trees by communities to protect riverine areas for enhanced river flow recharging. The project subdivided the river basin into five sections each 5km² with a population of 800-1000 households. The goal of UTaNRMP was to contribute to reduction of rural poverty in the upper Tana catchment while conserving the environmental resources. The project promoted planting of trees and grasses to protect river banks and reap more benefits to alleviate poverty and improve livelihoods. Community Forest Association (CFAs) spearheaded the restoration of degraded river banks through removal of environmentally unfriendly tree species and replacing them with indigenous species. The project provided incentives to enhance adoption of conservation measures and an elaborate monitoring system was put in place. The rewards were in form of quotations provided by farmer as what they perceived as losses incurred when switching to conservation measures from previous land uses.

The challenges the project faced included the following:

- Trees are long term investment and convincing farmers to adopt is not easy.
- Sensitization, organization, development of management plans and implementation is very costly
- High population and land fragmentation increases competition among alternative land uses that favoured food crops to environmental conservation activities such tree planting.
- Inadequacy of policy and legislation on holistic ecosystems conservation.
- There were issues of accountability and governance among partners.

Lessons learnt from the project were:

- There is need for proper baseline socioeconomic and ecological surveys to inform decision making and gauging success of projects
- Some of the compatible activities were bee-keeping, tree planting grassing of river banks, pig and rabbit rearing, biogas and zero grazing units.

2.2.2 Western Kenya Integrated Ecosystem Project

The project is located in western Kenya covering Nyando and Yala river basins that flow from the Mau forest complex into Lake Victoria. The Nyando River basin covers 3,587km^2 while Yala River basin covers 3,111km^2. The Nyando Basin has undergone some of the most severe environmental degradation leading to high poverty levels. The river is a major contributor of sediment and phosphorus to Lake Victoria. A scoping study by UNEP-PRESA project analyzed tradeoffs for generating environmental services and the policies and legislation likely to affect the design and implementation of rewards schemes in the basin. The study found that for establishing a payment or reward scheme, the Nyando and Yala river basins were unique in that both the upstream and downstream communities are poor small-scale farmers. The project initiated stakeholders' consortium with the objective of making a case for publicly-funded payments for environmental services. The consortium included the Lake Victoria Basin Commission, Lake Victoria Institute for Research and Development (VIRED), Maseno University, Moi University, World Neighbours, government agencies, the Kenya Agricultural Research Organization (KALRO), parliamentarians and community-based organizations. Overall, the project worked with an estimated 8,000 –12,000 households, and supported sustainable land management in 5-10 million hectares. KALRO was the intermediary while the World Bank was the funding agency and ICRAF provided research inputs and coordination of field activities.

The project's main Ecosystem commodity was improved management practices on- and off-farm for soil and water protection. The project promoted shifts from practicing short-term maize planting to more sustainable forms of agriculture – including tree-based enterprises such as orchards and fodder plantations. The interventions were expected to halt soil degradation, rehabilitate degraded areas, and thereby raise crop yields while making land use systems less susceptible to climate change and climatic extremes. Several demonstration plots were set up in strategic sites where farmers were exposed to facilitate them to choose the attractive opportunities available.

Payment was through materials support (seedling and farm inputs), capacity building (Training and visits), soil management practices (soil fertility and water management measures). The project was implemented through an initial grant of US$4.5 million from the GEF and World Bank loan of US$4.1 million.

Some challenges identified were:

- Absence of government agencies to regulate and manage ecosystem services
- Inadequate institutional structures and services to deal with the management of PES schemes;
- Insufficient evidence on financial superiority of conservation land uses to individual farmers as opposed wider societal good;

- No clear legal rights in the community-owned land where the project was based.
- Deficiencies of support to community-based organizations to sell, approve, or reject projects.

2.2.3 Naivasha Equitable Payments for Watershed Services

The project focus is on restoration of the riparian vegetation aimed to reduce sediment deposited into Lake Naivasha from the steep slopes of the upper catchment of Turasha and Kinja rivers in Nyandarua County. The Pilot project was to test viable mechanism for watershed services that delivers sustainable natural resource management and improved livelihoods. The project was divided into three phases beginning in 2006 namely scoping and feasibility studies (hydrological survey, cost-benefit analyses, livelihood analysis, business case analysis and legal policy framework analysis), implementation and scaling up. The catchment covers 3,400 km² and ranges in altitude from approximately 1,900 to about 3,900 m above sea level. Turasha and Kinja rivers are major tributaries of the River Malewa, which contributes 80% of the water that flows into Lake Naivasha. The project is on a sub-catchments level and two sites were selected as pilots: the Upper Turasha (639 hectares) and Wanjohi (4680 hectares) both areas are situated in the Malewa Basin. The economic activities include: small-scale and large-scale agriculture, horticulture, ranching, tourism, fishing, geothermal power production and pastoralism. Over 50 km² of land around the lake is under intensive, commercial horticulture and flower farming. These activities provide livelihoods for over 500,000 people.

Some of the factors experienced by farmers in the project sites were: poor land-use practices, unregulated and excessive water abstraction for domestic and agricultural/horticultural use, weak policy enforcement, population pressure on natural resources, water pollution and climate change, among others. The objective of the scheme was to develop a viable mechanism for payments for watershed services that delivers sustainable natural resource management and improved livelihoods and serves as a pilot and learning model for further expansion and replication

The Environmental Services (ES) stewards in the scheme were small-scale farmers in the identified hot spots. In total 565 farmers participated in the application of promoted land-use technologies voluntarily. The average size of landholdings of participants ranged from 0.8 to 4 hectares.

The key partners were Lake Naivasha Water Resource Users Association (downstream buyers), Lake Naivasha Growers Group (downstream buyers – the principal participant in the project among the buyers), Upper Turasha-Kinja Water Resource Users Associations (upstream sellers), Wanjohi Water Resource Users Associations (upstream sellers), Ministry of Agriculture, WRMA, Kenya Forest Service and Provincial Administration. The mode of operation was a Contractual agreement between the ecosystem stewards and beneficiaries. The agreement was to compensate small-scale farmers of the Upper Turasha-Kinja and Wanjohi (WRUAs). Incentive of USD 20,000, to two groups of 470 and 504 farmers was disbursed. In addition, farmers were provided with technologies and farm inputs aimed at increasing farm productivity and livelihoods. The buyers were the Lake Naivasha Growers Group and Lake Naivasha Riparian Association (LNRA). The legal agreement was signed on their behalf by the Lake Naivasha Water Resource Users Association (LANAWRUA). Payments were delivered through the WRUAs facilitated by WWF/CARE on behalf of the buyers. In the beginning WWF and CARE took up the role but more responsibilities were handed over to the Water Resource User Associations (WRUAs) with time. The project put strong emphasis on creating a buyer-seller forum that was envisioned to take over the project facilitation once WWF/CARE exited from their facilitating role.

Land-based commodity promoted were improved land-use and technologies in riparian protection areas, mostly agroforestry; indigenous tree planting; contours grass strips; high value crops; and other soil and water conserving practices (e.g. bench terraces). Agroforestry and soil protection technologies were expected to benefit farmers independently of PES scheme. The payment level was based on land-use technologies promoted as well as in situ benefits farmers receive from implementing the scheme and available project funds at that time. A business case study establishing the opportunity costs that farmers incurred when setting aside land for conservation found that the cost was too high for the buyers to afford affront before other benefits started to accrue with time. Agreement to the sum was reached with and between sellers and buyers after a rigorous negotiation process. The negotiation process consisted of a series of negotiation meetings between the buyers and sellers that let to revision of the draft contracts which were then discussed together in the seller-buyer forum.

Payments were made annually to individual farmers. The sum was fixed at US$17 per participant in the first three years. The scheme applied a voucher system, with each voucher worth US$17. They were redeemable with agro-inputs at agreed and convenient outlets.

Participants were to contribute their labour and material inputs (fodder crops, tree seedlings, and high value crops) were provided by CARE and WWF. Contracts were endorsed and signed for one year, renewable with revised terms and conditions agreeable between sellers and buyers.

The first payment in 2010 amounted to US$10,000.The opportunity costs of participating providers was expected to be recovered from co-effects such as provision of firewood, sale of fruits, reduced cost of fruits purchase and health improvement, capacity building and institutional strengthening on community level (WWF & CARE, 2010).

Some of the challenges were:

- The complex and dynamic land ownership due to inheritance and land-use change;
- Degraded public lands that influenced the water quality yet were not under the scheme;
- High interest of more participants than could be accommodated in the project
- Limited commitment of new buyers.
- Kenya currently has no specific PES policy.
- Under valuation of the ES resource.
- Water Act (2013 provide for water user fees exclusively channeled through WARMA the only agency recognized by the law.

Some Experiences

1. Land owners should be willing to participate and invest in conservation activities.
2. Key target hotspot sites included steep slopes, poorly cultivated farms and farms with water unfriendly practices.
3. Increased tree cover, grass strips and riparian land restoration reduced soil erosion and increased water conservation and soil fertility.
4. Difficulty in isolating the contribution of project activities to overall water flow resilience without taking into consideration other land use practices applied along the project sites.
5. Capacity building is costly for it ranged from KES 20,000 (US$ 244) for local community unit meetings to KES 300,000 (US$ 3,662) for high level seller-buyer meetings.
6. The Ex ante baseline studies on hydrological quality and socio-economic studies need to be undertaken for purposes of objective verification.
7. Farmers that don't adopt set land use practices and therefore don't achieve agreed upon conditions during verification were not awarded the ex situ benefits.
8. For purposes of objective verification river gauges and turbidity meters were installed in respective rivers to support verification process.
9. On-farm verification and monitoring was undertaken by buyers, support institutions and the sellers separately.
10. Biannually, consultants were hired for evaluation and monitoring.
11. In case of conflict or non-compliance WRUAs were responsible for conflict resolution meetings etc.

Some of the Lessons learnt from the project are:

1. Sustainable provision of ecosystem services can be achieved through changes in land-use practices, incentives to farmers, enhancing livelihoods and strong stakeholder partnership leads to more successful implementation.
2. There is need for baseline data to establish a strong business case for negotiation based on trust building and commitment among the stakeholders, establishing a market mechanism and appropriate and adequate capacity building.

Project recommendations include:

1. Up-scaling the scheme by engaging more buyers and sellers,
2. Need to link PES projects to REDD+ funding to widen the financing options
3. Lobbying for institutionalization of PES in the policy framework;
4. Linking of the pilot farmers to PES markets.

In conclusion pilot project results indicate that incentives can be used to achieve significant land- and water-management improvements. Since the project was implemented over a short period it was still too early to quantify the gains in water quality/quantity and livelihood improvements achieved.

2.2.4 Sasumua Pro-poor Rewards for Environmental Services in Africa (PRESA)

In Kenya, Water Resources Management Authority (WRMA) is the sole institution mandated to build the capacity of land owners organized in Water Resources Users' Associations (WRUA) to develop and implement Catchment Management Plans (CMPs). Water Services Trust Fund (WSTF) is the main financier in mobilization of community organizations to rehabilitate public owned land and reverse land degradation on privately owned land. World Agroforestry Centre (ICRAF) in partnership with the Jomo Kenyatta University of Agriculture and Technology (JKUAT) initiated a project to explore the potential for Payment for Ecosystems Services (PES) to address environmental degradation through its program, PRESA. The project targeted catchments supplying water to the Sasumua Reservoir operated by the Nairobi City Water and Sewerage Company (NWSC). The catchment is 107 km^2 and comprises three sub-catchments: Sasumua (67.44 km^2) Chania (20.23 km^2) and Kiburu (19.30 km^2). The sub-catchment is heavily populated with smallholder farmlands that on average measures 1 ha per household and generates most of the sediment, nutrients and other pollutants that flow into the Sasumua Reservoir. The ICRAF PRESA project has been operating in Sasumua watershed since September 2008 and has so far spent KES 13.6 million (US$ 159,864). The compensation mechanisms were in form of payment voucher for farm inputs

and partial support to tree planting and terracing operations

The study found that NWSC spends about KES 4.25 million (US$50,000) a year for clearing silt and flushing the intake works and about KES 16 million (US$187,500) on alum, a coagulant to clean water. The sediment flushed from filter backwashing is discharged downstream, causing problems at the Ng'ethu water treatment works, also managed by NWSC. These costs could be reduced substantially if partnerships are developed with upstream land owners to invest in sustainable land management practices that reduce sediment yield.

A business case for NWSC's engagement in PES was estimated based on a scenario of establishing a grass covered waterway of 3 m width and 20 km length. This could reduce sediment yield by 20%, and reduction in alum cost by about KES 2 million (US$ 23,256) per year. Through PES, the company would only need to spend KES 1.7 million (US$ 20,349) of this amount to support upland farmers with the establishment of the grass covered water ways in the first year and subsequently pay only US$ 3,290 a year towards maintenance.

A survey among water consumers in Nairobi indicated that over 40% were willing to pay an extra KES 279,650 (US$1.25) above their monthly water bill to finance conservation of Sasumua watershed. The area occupied by such a grass covered waterway would be on land owned by about 500 farmers resulting in earning of only about US$ 9/household /year. Nonetheless farmers are willing to engage because of the potential benefit from reduced soil erosion and fodder.

Some challenges identified by the project were:

1. Inadequate policy and legal framework to support PES schemes especially on generation of finances to distribute to farmers on conditional ES delivery
2. No minimum standards with sanctions for non-compliance to drive demand for ES.
3. Inadequate participation of strategic public sector agencies in PES schemes left the cost of capacity building and monitoring to donor agencies and partners such as NGOs and land owners.
4. In adequate funds to facilitate regular payments for increasing number of stewards within the targets areas because success of PES schemes are tied to regular payments.
5. The target areas scale in most cases were restricted to hotspots rather than the wider project area due to implementation and monitoring costs that reduced the impacts of such interventions.
6. In some cases payment to farmers was based on their actions at farm level not on what they delivered on the agreed ES quality.
7. The risk due to potential impacts of actions in-between projects sites and service delivery sites was not addressed especially if the distance was long.
8. The business case for PES in uplands with high population density was found not be so strong enough to generate sufficient household level benefits.

Some useful lessons:

- Each year NWSC spends $15 million on alum in addition to other chemicals and spends US $ 50,000 per year clearing silt and flushing intake works.
- Costs can be reduced with partnership between upstream land owners investing in sustainable land management practices.
- Terraces led to 85% reduction in sediment load while grass filter strips, contour farming, grass waterways each reduced sediment load by 40 – 50%.
- Establishing terraces and 10metre grass strips costed US$560 and 315 every year respectively.
- Farmer's acceptance rate for terraces which was most effective was 45% compared to 58% for grass strips
- Most households (91%) were willing to accept payments to establish SLP.
- NWSC stands to benefit from reduced expenditure of USD 300,000 on water treatment chemicals annually in addition to reduced frequency of unclogging blocked intakes.
- NSWC was not willing to pay any extra costs above those provided in Water Act 2013 because of heavy financial burdens.

Some recommendations

- WSTF will need to play greater role in PES schemes where there is no private sector buyer by providing enabling laws to subcontract WRUA to implement PES subsidy scheme
- PES to be explicitly stated in sectoral NRM policies and laws that will oblige beneficiary entities to pay for ES
- Policy amendment to allow portion of revenue collected on ES to be retained within area collected for use by WRUA to finance PES
- Build capacity of corporate world to understand business potential of investing in NRM through PES

2.2.5 Green Water Credit Initiatives

Green Water Credit is an investment mechanism that is focused on enabling upstream farmers to practice water management activities. The Green Water Credits team with ISRIC World Soil Information as the lead agency assists financiers that are establishing projects and programmes by assisting in performing scenario studies and cost-benefit analyses. The team is working in Kenya, China and Morocco. The GWC team is assisting Kenyan

stakeholders that want to use the principles of Green Water Credits for improved land and water management. KALRO-ISRIC started testing the concept of Green Water Credits in the Tana River Basin in 2007 and since then, biophysical and socio-economic studies have been undertaken that show that water users in downstream areas including Nairobi greatly benefit from conservation measures undertaken on rain-fed farms, such as bench terraces, ridging, contour bunds and minimum tillage. The Upper Tana Basin pilot area encompasses 17,420 km^2 and 100,000-150,000 smallholders. The project is focused on poverty alleviation as the primary objective in its US$ 68 million investments (2012-2020). The money funding the scheme is sourced from the International Fund for Agricultural Development (IFAD), the Spanish Trust Fund and local private stakeholders Ken Gen, Nairobi Water Company, Water Services Trust Fund and the Equity Bank. In both Kenya and Morocco the scenario studies have shown that the benefits of Green Water Management by far outstrip the costs and that a fund and programme for rain-fed farmers is feasible.

Preliminary results

- The annual benefits derived from these 'green water management' practices are put at between US$ 12 and 95 million as compared to annual costs of US$ 2 to 20 million.
- Under a minimum of 20 % adoption scenario, the annual water benefits would be US$ 6 to 48 million compared with costs of US$ 0.5 to 4.3 million – a ten-fold return on investment.
- Half of this benefit would come from the decreased silting of the dams used for hydropower generation.
- Improved water availability would also increase profits, and benefits such as higher crop yields, flood mitigation and carbon sequestration have not even been included in these figures.

Recommendations

- Taxes raised from extra profits arising from Green Water Management should be put in a GWC fund earmarked for training, investment, loans, making of legal agreements, covering other implementation costs and training.
- A professional entity should be charged with managing the GWC fund.
- The revolving fund needs seed capital to be able to pre-finance the initial costs of the Green Water Credits system.

2.3 REDD+ and Forest Carbon Projects

There are some forest development projects that exploit PES activities to motivate communities and landowners to practice good land stewardship to mitigate detrimental effects of climate change in the country.

2.3.1: Wildlife Works Carbon / Kasigau Corridor, Kenya

Wildlife Works was founded in 1997 with a mission to bring market-based solutions to conservation of biodiversity by providing sustainable economic benefits to rural communities through REDD+ project solutions. Rural communities are supported to lead a better life, feed their children and put them through school without damaging the environment in which they live. The Kasigau Corridor REDD project was first to be issued Voluntary Emission Reductions (VERs) for REDD under both the Verified Carbon Standard (VCS), and the Climate Community and Biodiversity Standard (CCB), the two most comprehensive carbon accounting standards for issuing credits in the voluntary markets. The project received significant startup funding from BNP Paribas in the form of an option pledge to buy VERs over a 5 year period. The project estimates to generate over 1 million VERs per year, making it the first mega project under the VCS, to avoid the emission of over 30,000,000 MT of CO2 over the life of the project. The project is protecting 200,000 hectares of dryland forest in southeastern Kenya that forms a corridor between two National Parks, Tsavo East and Tsavo West. It involves 150,000 people who benefit from the distribution of revenues from the sale of the project's carbon offsets.

The REDD+ model is a success story because some critical elements revolving around job creation, agricultural intensification, enhanced wildlife protection monitoring, fuel wood substitution, agroforestry practices and investment in social infrastructure (schools and health).

It is reported that 2000 elephants live and migrate through the corridor as well other populations of endangered species such as cheetah and Grevy's zebra. For this, The Kasigau project was awarded the additional distinction of Gold level status by the CCB for exceptional biodiversity and climate benefits.

2.3.2: Chyulu Hills REDD+ Project

The Chyulu Hills REDD+ Project (CHRP) is a multi-partner initiative designed to promote climate change mitigation and adaptation through restoration of biodiversity and creation of alternative livelihoods. The concept is based on the United Nations scheme of Reducing Emissions from Deforestation and forest Degradation (REDD+). It is located in the Tsavo-Amboseli ecosystem in Southeastern Kenya and stretches over an area of 410,533.84 ha. The main geographic feature is the Chyulu Hill Mountains within the expansive Tsavo East and West national parks Kenya's largest protected area and the Amboseli National Park. The project aim is to create a corridor within the Tsavo-Amboseli ecosystems. The major goal was to maintain the ecological health of this vitally important ecosystem by providing economically viable and sustainable alternatives to its destruction. The CHRP aims to generate benefits in the areas of climate, community and biodiversity under the Verified Carbon

Standard (VCS) and the Climate, Community and Biodiversity (CCB) standards. Its specific climate related goals are to prevent the emission of 18,452,476 MT of CO2e over the Project's 30-year crediting period by stopping deforestation, forest degradation and grassland conversion.

The Greenhouse Gas Verification Program has conducted a verification audit of the "The Chyulu Hills REDD+ Project" against the requirements of the Climate Community Biodiversity Alliance (CCBA) Project Design Standards Second Edition. The results of the verification activities showed that its meets the quality standard defined by CCBA. "The Chyulu Hills REDD+ Project" conforms to the 14 Required CCB Criteria. The CHRP aims to generate benefits in the areas of climate, community and biodiversity under both the Verified Carbon Standard (VCS) and Climate, Community and Biodiversity (CCB) standards. Its specific climate related goals are to prevent the emission of 28,122,572 MT CO2e over the project's 30 year crediting period by stopping deforestation, forest degradation and grassland conversion.

The selling point of CHRP is enhancing and strengthening landscape protection, improving livestock management practices, employing forest rangers, bolstering employee motivation, creating alternative income, jobs and employment opportunities, and supporting stricter environmental law enforcement. It aims to restore degraded forest and grassland areas to increase the quantity of sequestered carbon from woody biomass and soil. The establishment of tree nurseries, reforestation programs and other afforestation / reforestation (A/R) efforts are examples of some initiatives being undertaken.

2.2.3: Compensating for livestock killed by lions: PES as a Policy Arrangement

The project was as a result of frequent human–wildlife conflicts and the related threat of extinction of the African lion. In 2003, the Maasailand Preservation Trust established a fund at the Mbirikani Group Ranch in southern Kenya to provide monetary compensation for livestock killed by wildlife. The policy arrangement approach (PAA) was used to analyze the appropriateness of the programme for environmental services (PES) that revealed that a considerable reduction in the number of lions killed was possible.

Lesson learnt

1. The arrangement is difficult to sustain or reverse the human-wildlife conflict but likely to create a new cycle of dependence
2. Drawbacks from compensation fund can be addressed by combination of arrangements with other public and private policies and initiatives.
3. More elaborate examination and comparison of different kinds of experiments with PES-like arrangements are required to further build understanding of the potential and different contributions of public and private sector players to conservation of the country's assets.

3.0 Other PES related projects

3.1 Carbon Offset Forestry Projects

Some of the ongoing activities include:

i. The Kenya Forest Service and the Green Belt Movement Bio Carbon Project financed community based CDM programme on 1,877 ha of degraded sites within the Mt. Kenya and Aberdare ecosystems. The Community Forest Associations (CFAs) are supported by GBM in Kabaranyeki in Central Imenti and Kienini and Kiriti in North Imenti in Meru County and Mugeria and Kabaru in Nyeri County to rehabilitate through tree planting in degraded forest lands with mix of fast, medium and slow growing indigenous tree species. KFS provides protection of the rehabilitated areas to reduce damages by livestock and others land uses. A CFA member gets revenue from carbon sales and GBM receives verified emission reductions. The project is expected to sequester 750,000 MT of carbon dioxide equivalent at a value of USD 4 per MT per year.

ii. The International Small Group Tree Planting Programme (TIST) supported by Clean Air Action Corporation (CAAC) with support from Institute for Environmental Innovation (I4EI) and USAID. The smallholder farmers in Meru, and Laikipia counties to undertake afforestation and reforestation project activities under the voluntary CDM. The farmers receive training from TIST and part of carbon revenues from CAAC. The project has potential to sequester 580,000 MT of carbon dioxide equivalent while significantly improving the livelihoods of the farmers who plant trees that provide environmental service.

iii. A community based group (**ESCONET)** with financial support from Carbon Footprint is currently involved in Afforestation and reforestation activities in the escarpment landscapes in Kiambu County.

iv. The Forest Again Project implemented by KFS and Kakamega Environmental Education Programme (KEEP) financed Hyundai Climate Change Grant through Eco2librium is focused on planting of indigenous trees and engaging on various forest related income generating activities such honey, herbal medicines and butterfly rearing. The project aim at afforestation on 500 ha degraded parts of Kakamega forest with a mixture of fast, medium and slow growing indigenous tree species as a carbon offset project. The community members are supported from carbon revenues generated by the project activities.

v. Rukinga Wildlife Sanctuary and Rukinga Game Ranch in Taita Taveta County have established a REDD

project that is a combination of dryland forest protection and extraordinary community sustainable development activities. This project is estimated to avoid the emission of over 3.5 million MT of CO2 which would have been emitted by slash and burn deforestation over the 20 year project life that translates to 175,000 MT per year.

vi. Mkoko Pamoja, Mangrove Restoration Projects in Gazi Bay, Kwale District is a collaborative activity by Gazi Area CFA, Earthwatch International and Kenya Marine and Fisheries Research Institute (KMFRI) with startup funding from Aviva, Earthswatch Institute, Edinburgh Napier, Bangor and Edinburgh Universities and KMFRI. The project aims at restoration of mangroves in Gazi Bay area and raise future revenues to sustain it through sale of forest resources and carbon credits.

vii. Kenya WaTER Programme (2016-2020) supported by EU to the tune of EUR 30 million (KES 3.1 billion) under climate change mitigation and adaptation through forest conservation, income generation activities (IGAs) and promotion of viable PES schemes in Cherangany and Mt Elgon Ecosystems within 11 counties in western Kenya. The implementing agencies include MENR, KEFRI, KFS, KWS, County Governments (11), CBOs, farmers, women and youth groups, entrepreneurs marginalized groups and indigenous communities. It has some PES component that aims developing and at piloting PES schemes and business cases in the two ecosystems

viii. KEFRI Climate Change Adaptation Project being implemented in various sites across the country guided by natural resources conservation land uses and livelihoods enhancing activities. This is two year project funded by Climate Change Fund managed by NEMA.

ix. Nairobi Water Fund project implemented through The Nature Conservancy (TNC) that has brought public, private and NGOs together to pool resources for supporting friendly conservation practices in Upper Tana catchment. The project aims to provide incentives that would lead to conservation of Aberdares and Mt Kenya water towers.

3.2 Clean Development Mechanism Projects in Kenya

The Clean Development Mechanism (CDM) is one of the Flexible Mechanisms defined in the Kyoto Protocol (IPCC, 2007) that provides for emissions reduction projects which generate Certified Emission Reduction units (CERs) which may be traded in emissions trading schemes. The CDM facilitates developed industrialized countries that emit high carbon to offset part of their emission reduction commitments under the Kyoto Protocol by buying Certified Emission Reduction (CERs) units from CDM emission reduction projects in developing countries. By 2012, 4,626 projects had been registered by the CDM Executive Board as CDM projects that translate into 648,232,798 CERs with about 60% of them originating from China, India, Republic of Korea, and Brazil. Africa accounted for less than 3% of the global CDM projects. In terms of CDM projects, Kenya was among the leading recipients in Africa that included the Mumias Sugar Company's Bagasse co-generation project and geothermal and hydro-electric energy projects among others (Table 1). When fully operational these projects will have earned the country huge amounts of money through the sale of more than 600,000 MT of carbon equivalent to the World Bank per year. The future of CDM after Paris Agreement is still uncertain but some work on shaping its future replacements is ongoing.

Table 1: CDM projects in Kenya

Project	Technology	Reductions*
Bagasse-based co-generation project, Mumias Sugar Company	Co-generation	95,521
Sondu Miriu hydro-electric project	Co-generation	211,068
Olkaria II geothermal expansion project		171,026
Conversion of the Kipevu open-cycle gas turbine to a combined-cycle operation project	Co-generation	44,808
Redevelopment of Tana hydro-electric station	Co-generation	42,258
Optimization of Kiambere hydro-electric project	Co-generation	38,376
Bagasse-based co-generation project, Muhoroni Sugar Company	Co-generation	16,758
Total		619,815

* Unit measure MT carbon equivalent (MTCe)

Lessons learnt

1. There are opportunities for climate change adaptation funds for large scale agro-forestry enterprises through CDM projects
2. The framing of adaptation projects should reflect some of the good aspects for PES to address livelihoods and forest/environmental conservation.

4. 0 Challenges implementation of effective PES schemes in Kenya

4.1 Policy and legislative

- Inadequate PES policy and legal framework to entrench PES management relevant sectors.
- Weak enforcement of existing legislation and regulations.

4.2 Institutional challenges

- Low Institutional, technical capacity and governance to address PES
- Poor coordination of multi sectoral approaches necessary to operationalize PES
- The country's inadequate capacity to exploit PES opportunities.
- Inadequate inventory and valuation information for different ecosystem goods and services that has contributed to their undervaluation.

4.3 Sustainable NR management challenges

- Inadequate involvement of stakeholders in NRM activities including the private sector.
- Inadequate NR management data and information to inform sustainable management.
- Inadequate sustainable ecosystems markets for long term investments.
- Slow pace in restoration of degraded ecosystems that undermine buyer's expectations.
- Inadequate awareness creation and resource mobilization to support PES

4.4 Information challenges

- Inadequate awareness on PES at different levels
- Inadequate data and management information systems on PES and REDD+ activities
- NR data is currently scattered in different institutions and in different formats.

4.5 Resource Mobilization

Tapping carbon finance and other opportunities has been slow due to various reasons key being fulfilment of start-up structures such as policies, laws and databases on carbon stock, markets and financing. However, there are efforts on development of innovative financing mechanism that aim at rewarding innovations through budgetary allocation by Treasury to promote PES and other climate change related investments.

5.0 Potential opportunities of PES investment in Kenya

The study confirmed that PES has becomes an attractive investment in Kenya and many projects have been initiated mostly to test its viability and prerequisite conditions. Most of the projects are based on sustainable principles and that need supporting policies, laws and efficient structures. PES models were premised on proven ability of ES to attract the attention of beneficiaries, sustainably managed and voluntary participation of land owners or stewards. The PES schemes are based on mutual self-interests of service users and providers. To operationalize the schemes many projects had to undertake land use and socioeconomic baseline surveys, develop package of ES commodities, calculate some minimum base payment based on some mutually agreed formulae backed by some scientific principles.

5.1 Policies and Laws that drive PES

Most of the PES projects were supported by existing policies and legislations with background foundation of international conventions and agreements on environmental conservation. The national instruments that supported PES per ES categories are:

- Biodiversity: National Museums and Monuments Act 2012, Environmental Coordination and Management Act 999, National Forest Management and Conservation Act 2016.
- Water – Water Policy 1996, Water Act 2013
- Carbon – Environment: Agriculture, Forestry and Energy Policies are supportive of PES
- Constitution of Kenya 2010
- National Forest Conservation and Management Act 2016.

5.2 Institutions driving PES in the country

The key environmental services are biodiversity, water and carbon sinks whose regulation and management fall within several public regulation and management agencies in the sector of environment and natural resources, wildlife, water, energy, and agriculture. The other key players include private sector actors, farmers, NGOs/CBOs, universities and international organizations (ICRAF and UNEP).

5.3 Preconditions for Growth PES projects

There are some key prerequisites to enable the country to attract investments to implement PES schemes. Key among these are the following:

- Enabling policy, legal, institutional frameworks, property rights and incentives to sustain ecosystem investment action.
- Development of transparent payment mechanisms based on mutually agreed upon contracts.
- The projects need to invest heavily on capacity building-training of both suppliers and buyers
- The projects should be based on strong business model partnerships of public agencies, land owners, international agencies, local utility firms and communities;
- The funding agencies should be secured through innovative financing mechanisms within the global set guidelines.
- The projects should be backed by strong research inputs on baseline information, data collection and scenario simulations
- Projects should include deliberate ecosystem valuation to inform decisions by partners involved in the project.

5.4 Opportunities for PES in Kenya

The country has enormous potential to undertake PES related projects with enormous financial and social benefits. However, it has to address prerequisites and challenges mentioned above to provide fertile enabling environment for PES in the country. PES has enormous potential in conservation of environment and provision of incentives for positive conservation measures. In the area of forestry PES has potential in the following:

5.4.1 Payment for hydrological services

The ecosystem service here is water for domestic, industrial and irrigation use as well as water for generation of hydroelectric power. PES is expected to provide incentive to land owners in key water catchment. Work on feasibility of PES in water for domestic consumption in Nairobi is ongoing and may need to be extended to water used for hydroelectric power generation.

5.4.2 Ecotourism

Tourism is the main foreign currency earner in the country. Forest habitats for flora and fauna that can attract incentive based mechanism to enhance their conservation and development as tourism sites.

5.4.3 Carbon sequestration and climate change:

This is well covered under REDD+ discussions and some projects are already being implemented or underway.

5.4.4 Intellectual property rights

The existence of policies and laws on intellectual property rights will facilitate communities to benefit from their skills and diverse resources within their localities.

5.4.5 Generation of power using wind

Forests have good sites suitable for wind turbines to generate electricity and investment in community social assets.

5.4.6 Recreation activities

Forests located in major towns with increasing population, and demand for recreation that can be managed for recreation purpose and in return the users will pay for this service. Karura Forest and Nairobi Arboretum are good examples.

5.4.7 Biodiversity

Natural forests in Kenya have unique flora and fauna classified as rare, endangered and endemic. Some sites are already classifies under UNESCO man and biosphere and as Important Bird Areas. Opportunities exists for innovative PES schemes to facilitate payment for protection of important biodiversity hot spots.

6.0 Financing Sustainable Use of Ecosystem Services

Financial mechanisms are critical tools in PES for it enables calculation and channeling of beneficiary/donor funds to service provider in return for the service. The financial mechanism operates through a set of rules and procedures to effect the movement of money or a payment instruction from a service buyer to a service seller. There are four broad financial mechanisms that are feasible for Kenya conditions namely.

6.1 Public payment schemes:

The government provides the institutional foundation for a program and directly invests in it as well. Examples include:

- Permanent conservation easements
- Contract farmland set aside for conservation
- Programs to co-finance investments in afforestation or sustainable forest management
- Payments for the confirmed presence of endangered wildlife species.

6.2 Open trading under a regulatory cap or floor

The government defines a mandatory level of a specific ecosystem service to be provided. It obliges parties to choose either to comply directly with the requirement or to pay others, who are in the position to supply the service more cheaply. Some examples include:

- Wetland mitigation banking
- Tradable Development Rights
- Salinity credit trading
- Carbon emission offset trading

6.3 Self-organized private deals

Direct negotiations and transactions between offsite beneficiaries of forest services and forest landholders responsible for the services. Examples include:

- Hydro power companies paying land owners upstream for managing forest cover in the designated watershed
- NGO partnership with local people to restore degraded land
- A pharmaceutical company paying for access to a certain area or for the collecting work by local people of potentially valuable organisms.

6.4 Eco-labeling of forest or farm products

The process is handled by private actors to facilitate payments for ecosystem services that are embedded in a traded product. Examples include Forest Stewardship Council (FSC) timber and non-timber certification

7.0 Way Forward

The pilot PES projects undertaken in the country indicate that there are benefits to be gained by custodians and beneficiaries participating in such schemes. Therefore the experiences from pilot schemes and other global success stories can enable the country to craft cost-effective PES programmes for diverse ES characteristics, biophysical and socio-economic context. This is because different types of PES schemes are appropriate to different socio-economic and agro-ecological contexts. The process of designing an effective payment programme involves four important and challenging steps: identifying what should be paid for; who should be paid; how much should be paid; and what payment mechanism(s) should be used.

8.0 Conclusion

PES approaches have potential to provide incentives to the forest dwelling and adjacent community, individuals farming communities, and the institutions who are custodians of the natural resources. The PES pilot studies reviewed indicate that there are opportunities to engage the providers and buyers of the services in negotiations prior to implementing such schemes. Mixes of local and international financial mechanisms are feasible for the diverse PES schemes. Kenya can take advantage of the experiences from the pilot studies to design and implement PES models within the context of the local situations. In addition more studies are required to determine value of various ES as it is vital to determining value in the market and possible payment mechanisms. The agencies that

have interest in forestry and other environment services should continue to pursue the path of PES mechanisms to address environmental degradation and diminishing environmental resources. This is premised on the fact that ES services directly and indirectly support socioeconomic development especially at local levels.

9.0 Recommendations

The following recommendations can be drawn from the study review:

- PES has high potential to address some of the conservation and management issues
- Policy and legislative reforms are needed to mainstream PES principles into conservation project and activities and enhance enforcement of existing legislation and Acts
- Strengthening of Institutional, technical capacity and governance on PES and coordination across sector
- To enhance sustainable NR through accelerated restoration of degraded ecosystems
- Enhance awareness creation and involvement of various stakeholders in NRM including private sector
- Consolidation of data and information on NR to inform PES engagement and sustainable management
- Promote sustainable ecosystems markets for long term investments
- Review the progress and scale up viable PES options in various ecosystems in the country

10.0 References

Anyango-van Zwieten, N., Van Derdum, R., and Vissseren-Hamakers, I. (2015). Compensating for livestock killed by lions: Payment for environmental services as a policy arrangement. *Environmental Conservation, 42*(4), 363-372. doi

Berttram, D. (2011). Positioning the Kagera Transboundary Agro-ecosystem Management Programme (TAMP) project in the PES landscape of East Africa. FAO-NRL

Chomitz , K., Brenes, E.and Constantino, L. (1998). Financing Environmental Services: The Costa Rica Experience. 10, Central America Country Management unit, Latin America and the Caribbean Region, The world Bank.

FAO-CARE, (2008). Workshop report, The role of payments for environmental services as reward mechanisms for sustainable land management in East Africa. FAO-CARE, Dar es Salaam, p. 20 pp.

Forests Act, (2005). Ministry of Environment and natural resources. Government printers, Nairobi

Goldman- Benner, Rebecca., Silviabenitez, Timothy Boucher , Alejandrocalvache, Gretchendaily, Peterkareiva, Timm Kroeger and Aurelioramos, (2011). Water funds and payments for ecosystem services: practice learns from theory and theory can learn from practice. Cambridge journal.

Landell-Mills, N., Porras, I.T., (2002). Silver bullet or fool's gold? A global review of markets for forest environmental services and their impact on the poor. International Institute for Environment and Development, London, UK.

Mutunga and Mwangi (2005) An Inventory of current ecosystem service payments, markets and capacity building in Kenya. Document presented at the Eighth Public Meeting of the Katoomba Group- Building Foundations for Pro-Poor Ecosystem Services in Africa 19-22 September, 2005, Uganda.

Pagila, (2003). Can Programs of Payments for environmental Services Help {reserve Wildlife?. Workshop on Economic Incentives and Trade Policies. Geneva, Dec 2003

Powell, I., White, A., Landell-Mills, N., (2002). Developing markets for ecosystem services of forests. Forest Trends ISBN 0-9713606-3-4.

Scherr, S., White, A., Khare, A., (2004). For services rendered: The current status and future potential of markets for the ecosystem services provided by tropical forests. International Tropical Timber Organization (ITTO) Technical Series No 21.

Vision 2030, (2007). Government Printers, Nairobi

Water Act (2002). Government printers, Nairobi