Report

Payment for Ecosystem Services in Sri Lanka: A General Scoping on Existing Condition and Policies

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Executive Summary

The Knuckles Mountain range of Sri Lanka which is home to a rich biodiversity of flora and fauna holds great potential for agriculture and economic development. Community involvement in conservation measures is imperative in implementing sustainable interventions. A Payment for ecosystem services (PES) scheme is a nature-based approach to remunerating communities for the maintenance, conservation, and restoration of ecological structures in the area.

This scoping study was carried out to assess the exiting mechanisms and the potential for environmental service markets in the form of payments for ecosystem services or PES-like models to support watershed conservation and catchment forest conservation including viable policy and institutional frameworks required to facilitate their implementation in Sri Lanka. The scoping study was carried out between September to December 2023 focusing on implemented and proposed PES and PES-like schemes. A systematic review of published research articles, a review of anecdotal evidence and expert interviews were carried out during the scoping study. It was revealed that a majority of the schemes are at proposal or research stage and have not been developed in to actual cash transfers. Cash transfers that have taken place also have not been established under a proper legal agreements or contracts. Studies and projects covering Sri Lanka covers a wide range of ecosystems and services including watershed protection, carbon markets and biodiversity conservation.

Findings reveal that Sri Lanka in general and the Knuckles region in particular hold great potential for implementing PES schemes. It is imperative to develop a legal and institutional framework to ensure an equitable mechanism that provides expected distribution benefits to the buyers and sellers. A strong legal and enforcement system is needed to ensure a financial mechanism to achieve sustainable environmental, social and economic goals. For example, land use and tenure rights are concerning factors in most areas. Community based organizations can play a crucial role in watershed conservation efforts. The private sector is willing to support performance-based monitored systems to develop voluntary mechanisms that brings them anticipated benefits.

It is important to recognize that the private sector can make an important contribution, not only financially but also by sharing its wealth of practical experience as well as welfare contributions. Commercial enterprises are important buyers of ecosystem services, as when hydroelectric companies buy through payments of user fees. They play intermediary roles and provide ancillary services.

The National Environnemental Action Plan 2022-2030 highlights the importance of such mechanisms backed by explicit policies and strategies in their diverse forms related to water, environment/nature, agriculture/forestry and (public) utilities sectors. These policies and strategies should also refer to the establishment of PES and other measures to improve ecosystem services under existing and future integrated water resource management plans.

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1. Payment for Ecosystem Services (PES) as a biodiversity financing option for Sri Lanka

1.1 Experiences of public and private sectors in Sri Lanka in designing, implementing, monitoring, and evaluating the performance-based financial transfer mechanisms for ecosystem services

Payment for ecosystems services (PES) include schemes where payments are made to providers by the users of ecosystems services. These payments may include cash or in-kind transfers in various forms. This is a relatively new concept that's gaining recognition as a successful tool and is being adopted globally. PES schemes as well as Remunerative Ecosystem Services (RES) schemes are widely being adopted in terms of biodiversity conservation, watershed management and carbon trading world-wide.

As a country with high biodiversity and high endemicity, the responsibilities entrusted with the country for managing the biodiversity in sustainable manner is enormous. There is huge potential for Sri Lanka to adopt PES or PES-like models to gain a wide range of environmental, economic and social benefits.

Sri Lanka's National Environmental Action Plan (NEAP 2022-2030) identifies the importance of setting out programmes and projects to implement PES mechanisms for Sri Lanka for its numerous benefits. The biodiversity finance plan/ Biodiversity Finance Initiative (BIOFIN) of Sri Lanka identifies several key PES mechanisms for watershed conservation, biodiversity conservation and energy sector improvement. Therefore, Payment for Ecosystem Services has resurfaced as one of the priority biodiversity financing initiatives for Sri Lanka.

In order to assess the feasibility of applying this concept at field level a field level demonstration of PES this study carried out a systematic process to understand the existing projects/programmes implemented and in the process of implementing such mechanisms. A comprehensive literature review was initially carried out to obtain published and anecdotal evidence of such mechanisms in Sri Lanka. Expert interviews, focus group discussions with government officials, private sector organisations and other related institutions was conducted to gain more insight.

This study expects to identify institutional roles and responsibilities in mainstreaming PES as a potential financing instrument, identify barriers including, inter alia, policy, legal, institutional, and societal for upscaling PES at a national level and propose strategies to overcome them and finally, to provide an assessment on the possibility of applying PES as a successful tool in the country.

1.2 Payment for Ecosystem Services: Potential for Application

As a way to manage the environment using economic incentives, PES has become more popular (Farley and Costanza., 2010). Also, PES can be viewed as an incentive-based conservation approach which involves the financial transfer to the services provider. The financial transfer shall depend on the act that is considered to generate ecosystem services or the supply of ecosystem services (Engel et al., 2008; Wunder, 2007). In maintaining the community's perception of nature values, the strategy of PES provides a higher potential to assist community development (Redford and Adams, 1989). Despite the growing number of PES projects and extensive discussion of beneficial impacts, literature on impact measurement is still lacking. Most studies show simple estimations or anecdotal evidence of PES project impacts (Landell-Mills and Porras, 2002; Pagiola et al., 2005; Wunder, 2005). Although many proponents argued that the PES models can address both development and conservation objectives, this concept emerged as a mechanism to improve the conservation of natural resources but it is not necessarily a means of reducing poverty (Grieg-Gran et al., 2005; Landell-Mills and Porras, 2002; Pagiola et al., 2005).

Payment for Ecosystem Services (PES) can be defined as an act of providing either financial or non-financial payment to the land manager for the environmental services provided by the land (Leimona et al.,2011). A PES model is based on the principle that payments should be done by those who derive benefits and those who provide the environmental services (ES) be compensated. Recently, the use of PES conservation projects in both developing and developed countries has grown widely (Fisher et al., 2008; Jack et al., 2008; Landell-Mills and Porras, 2002; Pagiola et al., 2008).

In a PES project, there are both negative and positive impacts and project activities that target poor landowners and/or direct cash payments can be taken as the direct beneficial impacts (Grieg-Gran et al., 2005; Pagiola et al., 2005). Increased elite control of lands with insecure land tenure and curtailed resource access to low-income populations are commonly cited negative impacts of PES projects (Kerr, 2002; Landell-Mills and Porras, 2002; Pagiola et al., 2005; Wunder, 2005).

Hedge and Bull (2011) have analyzed the performance of an agroforestry-based PES project in Mozambique maintaining the potential of the PES project for programs like Reducing Emission from Deforestation and Degradation (REDD) and its derivatives, despite the benefit distribution and benefit size shortcomings.

Ferraro (2009) conducted a regional review of Payments for Watershed Services (PWS) in Sub-Saharan Africa focusing on two main objectives. The objectives were a brief characterization of proposed initiatives in South Africa and other nations and describe the reasons/ factors that cause Africa to have lesser PWS schemes than Latin America and other regions with more such initiatives. African PES initiatives are funded through international conservation organizations, overseas development assistance and governmental agencies. Currently, there can be seen an

increase in the involvement of governmental agencies while there is very little involvement of the private sector. The potential for the plant to pay upstream land users to alter their land use in ways that reduce agricultural pollution and sedimentation has been explored by some projects. when the damage is already visible, making the case for payments easier, however, it is said that preventing the damage from arising in the first place is less costly than reversing the damage (Ferraro.,2009)

PES pilot projects show that policies establishing the right to buy and sell ecosystem stewardship services have not been essential in most countries. South African and East African PES inventory summary report highlights the lack of supporting the legislation as a barrier. Also, the report claims that most of the countries lack financial intermediaries, certification bodies, national registries for ecosystem services and other necessary institutions in the value chain. A value chain is a path from a seller to a buyer which increases the costs of PES transactions (Katoomba Group, 2006).

Hedge and Bull (2011) have evaluated the impacts of household level in a small scale agro-forestry based carbon sequestration project in rural Mozambique using the PES concept and found that PES-participant households incurred more consumption expenditure, earned more cash income, harvested lower quantities of agriculture crops and collected fewer forest products, in contrast to nonparticipant households. Further, they found that there was a differential in the income of the PES through decomposition analysis. Based on the study, Hedge and Bull (2011) recommend that PES projects in the future should focus on a better payment scheme that can ensure benefits to all the participants while paying extra attention to the vulnerable households and benefit distribution to them.

Khairiaha et al. (2016) have monitored a PES model implementation in Cidanau Watershed, Indonesia using the stands density approach and found that it can encourage the community to take forest stand conservation actions in their lands. Feng et al. (2018) reviewed the progress, mechanism and challenges of payments for watershed ecosystem services using 27 schemes piloted in China and ten other countries. The authors have concluded that in China, it is essential to estimate the social and economic costs related to the livelihoods of households and also it is necessary to use a multi-stakeholder negotiation mechanism for payments for watershed services. Also, these multi-stakeholder negotiation mechanisms should include NGO/NPOs, user associations, local government and other intermediaries. Studies done regarding the contribution of PES in funding biodiversity conservation in middle- and low-income developing countries are mostly in the tropical regions (Hein et al.,2013).

Certain studies have used field-level data, questionnaires and digital map data obtained from GIS to investigate the economic losses by adopting Integrated Valuation of Ecosystem Services and Trade-offs (InVEST model) and the soil erosion impact on reservoir sedimentation and the available mechanisms to minimize the impacts. For example, studies have found that the soil erosion rate is reduced by 23% by soil and water conservation intervention for the watershed. Furthermore, they have proposed an additional payment from the fertilizer importing authority of

the country as the payment from the power generation facility is not adequate and the conservation intervention by farmers requires that they are paid the full cost (Udayakumar and Gunawardena, 2022).

The above summary of the literature on PES and PES-like models shed light on the use of such schemes in similar conditions and context. PES could go beyond financial transfers and environmental concerns with specific and additional investment in socio-economic co-benefits termed as Remuneration of Positive Externalities (RPE).

1.3 PES and PES-like Mechanisms implemented and proposed for Sri Lanka

Case 1: Pilot programme for watershed conservation

The International Union for Conservation of Nature (IUCN) implemented a PES Pilot Project in Sri Lanka with the objective of establishing a pilot PES mechanism for conserving watershed ecosystem services in a given small-hydro scheme operated by a private sector entity to test the feasibility of using PES as an innovative financing mechanism for biodiversity and ecosystem conservation.

The main objective of this project was to plan and conduct a pilot study to determine whether PES can be applied successfully for watershed protection using a small hydro based approach. Based on the outcomes of the study, it was also expected to identify institutional roles and responsibilities in mainstreaming PES as a potential financing instrument, identify barriers including, inter alia, policy, legal, institutional, and societal for upscaling PES at a national level and propose strategies to overcome them and finally, to provide an assessment on the possibility of applying PES for other small hydro projects that are in operation.

A small hydropower developer (Vidullanka PLC) expressed willingness to commit financial resources for the PES initiative and acted as the buyer and the local community as the seller of the scheme. Scheme was piloted in the Ganthuna small hydropower Plant located in the upper catchment of Gurugoda Oya (a tributary of Kelani river) in the Aranayaka DS Division, Kegalla District, Sabaragamuwa Province. The small hydropower developer agreed to provide 60% of the budgetary needs for implementation of the restoration plan while the rest was to be provided by IUCN. The local coordination committee was established under the leadership of the Aranayake Divisional Secretary to oversee the implementation of the restoration plan. Some of the proposed activities below have been carried out.

Project outputs and community benefits included forest restoration in stream banks, enrichment of secondary forests, establishment of school forest blocks and a school orchard. However, activities that require training and participatory approach could not be carried out due to restrictions imposed for prevention of Covid-19. Further, Policy document was developed for mainstreaming PES for small hydro projects. This project identified that payment for ecosystem services in the context of

small hydro can be considered under two contexts. First, payment for ecosystem services when the watershed exists as a undegraded area either as a protected forest or privately managed forest where those who are receiving the service are already enjoying the benefits provided by the watershed and is willing to pay to continue to receive the benefits. Second, if the watershed is degraded, and the PES is used as a means of restoring the watershed to enhance the ecosystem services.

In the case of the first instance PES can be easily achieved as the beneficiaries can accrue the benefits immediately and therefore their investment on ecosystem preservation will lead to tangible outcomes. However, in such a scenario the payments made by the beneficiary should be invested in the watershed to manage the ecosystem in a sustainable manner.

In the case of the second scenario the benefits will not be accrued immediately since the ecosystem must be restored for it to start providing benefits, which will take time. The time taken to provide benefits will depend on the status of the watershed at the time of initializing the PES. Thus, in such an instance there will be a time lapse between investment by the potential beneficiary and receiving the full benefit of the investment. As there are no immediate benefits the potential beneficiaries will be reluctant to make the investment due to the uncertainty that they will be able to accrue the benefits. Therefore, in such a case the beneficiaries will have to be given some incentives during the interim period to entice them to make an investment on watershed improvement. Some possible incentives can be providing tax benefits in comparison to their investment, giving investors high priority when renewing their energy permits or license, rights to claim carbon credits for the trees planted in the watershed, providing a slightly higher price for the energy purchased in proportion to the investment made. Based on the findings of the study it is evident that small hydro operators will not be willing embrace the PES concept as they will not see in returns for their investment even though they all agree on the long-term value of such an investment.

Case 2: Participatory forestry on degraded forest lands

Between 1993-2000 the Government of Sri Lanka implemented the Participatory Forestry Project, with the intent of reducing deforestation and improving household livelihoods by promoting co-management and agro-forestry (Kallesoe, M. and De Alwis, 2005).

The project targeted all state-owned degraded forestlands except in the north and eastern provinces. The project's main objectives were to facilitate reforestation, by issuing lease agreements to farmers and by adopting a participatory approach to forest management. It was envisaged that this would create employment opportunities, raise income, reduce poverty and rehabilitate degraded areas. Furthermore, the institutional capacity of the forestry department was to be strengthened thereby enabling the expansion of its programmes for non-forest tree planting, adoptive research and privately operated village plant nurseries.

The objective of the Homestead Garden subcomponent of the project was to improve poor families'

livelihoods and health status by providing alternative livelihoods in the form of growing and selling timber and fruit. Between 20 and 40 seedlings of timber and fruit tree species were distributed to each household involved in the project. The main objectives of establishing Farm Wood Lots was to bring the illegal encroachment and logging of state forests to a halt while developing poor rural areas. Local communities and farmers were provided with lease agreements in return for undertaking sustainable forest management. Within a block of 20 to 30 hectares of degraded forestland, 0.4- hectare plots were given to poor and marginalized farmers for a period of 25 years - this included ownership over the trees grown in the wood lots. Lease agreements where subject to yearly renewal the first five years based on the farmers compliance towards maintaining the allocated land under forest cover. After the 15th year commercial thinning would be allowed with the approval of the Forest Department. During the initial phases of the project participating households where also provided with food coupons in return for labor.

Although the Participatory Forestry Project has been implemented with a main focus on reducing poverty and rehabilitating degraded forestlands, certain elements related to the suggested management structure and tenure rights bear relevance for PES and environmental service markets. Providing farmers with property rights, even for a limited period of time, has proven as an important first step in creating incentives for reforestation and sustainable land management.

Secured land tenure rights are often seen as a prerequisite for the continuous provision of environmental services, and as an initial guaranty that providers are able to influence and secure service provisions through their actions. Also developing a co-management structure seems to strengthen local participation and involvement. FWL and homestead gardens are excellent examples of how forests, if managed properly, can provide food, timber and income, while maintaining the provision of environmental services. By promoting joint management and stewardship the project has been able to improve local livelihoods and generate positive externalities. Study concludes the need for well defined property rights and incentives for sustainable management of the initiative.

Compensation for the provision of environmental services could be one option that would imply beneficiaries rewarding environmental service providers. Identifying and understanding the drivers of environmental service supply and demand is an initial step when developing markets for environmental services. Supply side drivers often depend on effective management and the ability to offer credible commitments towards the future supply of environmental services, which as mentioned internally, depends on providers holding property rights. Access to state forests through property rights, in the form of lease agreements, can in the participatory forestry project be utilized as the initial driver to kick-start the development of PES.

Case 3: Upper Watershed Management Project (UWMP)

The UWMP was initiated in 1998 and was set to run until the year 2005. The overall goal of the project was to address management issues in four major watersheds in Sri Lanka: Uma, Kirindi, Walawe and Kalu, and to suggest sustainable management approaches (Kallesoe, M. and De Alwis, 2005).

Main project objectives and components included: providing lessons learnt facilitating thedevelopment of a national watershed policy, engaging local communities in forest management and applying a pro-poor approach to rehabilitation and conservation activities, specifically focusing on the upland poor. Land owned by the Land Reforms Commission (LRC) was sourced to farmers based on a 25- year lease agreement, and the farmers were given rights to harvest timber upon completion of the lease.

Technical assistance, seeds and plants were provided to the farmers through the project, and bee keeping and livestock raising where introduced as alternative livelihoods. Furthermore, the project initiated a micro credit scheme for the establishment of small timber farms, which acted as a financing mechanism to cover initial costs. By integrating homestead gardens into basin management the aim was to promote sustainable land use and institutionalize social and livelihood considerations into the decision making process. On a larger scale the project initiated establishing buffer zones, creating fire belts and rehabilitating reservation areas adjacent to water storage tanks. New community-based organizations (CBOs) were established and were along with existing CBOs provided with funds and technical support to assist in the implementation of these initiatives. The CBOs were, however expected to provide a 20% financial contribution.

In terms of a PES mechanism, the project identified the importance of clearly defined providers, which is needed to target environmental service rewards which otherwise could be jeopardized if a group or an entire community receives the payment. Free riding might become a problem. The UWMP has shown substantial progress in relation to community commitment and interaction. Environmental awareness has improved dramatically and the relationships between resource utilization and environmental impacts are relatively well understood.

Case 4: Renewable Energy for Rural Economic Development

The Energy Services Delivery Project (ESDP) was initiated in 1997 by the government, with the aim of providing poor rural areas with electricity by introducing village-operated micro-hydropower schemes.

The project facilitated the development of these schemes by providing financial and technical support based on proposals submitted by village CBOs. When the ESDP ended in 2002, a second phase was

initiated under the title: The Renewable Energy for Rural Economic Development Project (REREDP). The REREDP's target is to supply 100,000 households with electricity being generated by off-grid village micro-hydropower plants. Currently, the REREDP pays USD 400 per kilowatt capacity as an installment grant and also covers project development costs up to USD 6,000. At present, there are 1,042 village micro-hydropower plants with an installed capacity of 41,491 Kilowatts in the districts of: Ratnapura, Badulla, Nuwara Eliya, Kandy, Galle, Matara, Kegalle, Moneragala, Kalutara, and Matale.

**In the selection process of eligible projects, the state of an area's ecosystem is a determining factor as to whether or not a proposed projects receive funding. Proposed hydropower plants located in well-managed catchments have a higher likelihood of approval, and hence adjacent communities stand a better chance of benefiting directly from the provision of electricity. Local appreciation towards environmental conservation and ecosystem services has been enhanced through the ESDP and the REREDP. In some instances, local NGOs, CBOs and other community groups have played a crucial role in working with smallholders and securing the provision of environmental services. Members of CBOs overseeing the daily operations of the micro-hydropower plants are referred to as Electricity Consumer Societies (ECS). An organization called the Federation of Electricity Consumer Societies (FECS) has been formed and includes all the ECSs. Furthermore, project developers have been brought together under an organization called "VIHIDA", and the suppliers of hydropower technology will shortly also be united under a common structure. This level of organization provides a great opportunity to target a wide range of stakeholders with a minimal effort.

Case 5: Conservation and Sustainable Use of Medicinal Plants in Sri Lanka

Ayurveda, a healthcare system based on natural resources has traditionally been used for over two thousand years to treat illnesses and deceases.

It is estimated that about 30- 35% of Sri Lanka's population, mostly rural poor, use and collect medicinal plants (IUCN, 2004). Most medicinal plants are collected from the wild, but are also increasingly being cultivated in homestead gardens. In order to conserve these valuable plants the government of Sri Lanka implemented the Conservation and Sustainable Use of Medicinal Plants Project in 1998. The project seeks to secure conservation of globally and nationally significant medicinal plant species and their habitats through (a) in-situ conservation by establishing five medicinal plant conservation areas, (b) ex-situ cultivation by promoting nurseries, homestead gardens, plantation cultivation and supporting propagation and agronomic research and (c) by providing information and institutional support as well as promoting an appropriate legal and policy environment.

In recognition of the fact that many medicinal plants are under treat from over-harvesting and land conversion, the project focused on promoting sustainable harvesting and conservation among communities living adjacent to forests and other medicinal plant habitats. Regulations directly

restricting use were also imposed on the five established medicinal plant conservation areas (MPCAs) located in Bibile, Rajawaka, Naula, Kanneliya and Ritigala. In all MPCAs, including buffer zones, the project undertook a socio economic survey, a resource inventory and an ethno botanical survey to provide baseline information on resource dependence, resource status and correlations between culture, livelihood and resource harvesting.

Activities undertaken as part of the ex-situ conservation efforts included supporting the cultivation of medicinal plants in homestead gardens, establishing nurseries and training community members in their maintenance as well as investigating opportunities for selling medicinal plants commercially. Finally, the issue of intellectual property rights has prompted a legal framework to safeguard traditional knowledge associated with the use of medicinal plants. Relevance towards PES and environmental service markets, The national and local value of conserving medicinal species in Sri Lanka is apparent when considering the large number of people relying on these plants for healthcare purposes. Medicinal plants and biodiversity in general also represent a significant value on a global scale, which e.g. can be observed through the willingness to invest in bio-prospecting by pharmaceutical companies. The idea of benefit sharing is relatively new, but has gained ground and is now supported by the Convention on Biological Diversity (CBD). The strong emphasis now being placed on retaining and sharing benefits with local communities in connection with natural resource utilization, however, clearly supports the development of PES and biodiversity markets. Under the Conservation and Sustainable Use of Medicinal Plants Project, growing medicinal plants for commercial purposes has, as mentioned, been promoted and created alternative livelihood opportunities. Market access has been facilitated through the institutional setup established by the project, and capacity building and training have played a central role throughout its implementation. It is quite clear that when biodiversity conservation is able to produce tangible benefits such as tradable products, here in the form of medicinal plants, that incentives will exist to reward the people securing and positively impacting their provision. In Sri Lanka formalizing PES in connection with biodiversity conservation is believed to hold great potential, especially when coupled with medicinal plants or other high valued products.

Case 6: Conservation of Biodiversity and Water Resources in the Knuckles Range of Forests

In 1960, the Forest Department had issued permits to farmers allowing them to cultivate cardamom on forested state land, within the Knuckles Range, and in 1970 large areas of forest were leased out to big commercial cardamom cultivators. As a consequence, forest degradation and practises of slash and burn emerged. However, in 1988 the Knuckles Range was declared a Man and Biosphere Reserve. Cardamom cultivation was prohibited and a large number of farmers lost their livelihood. In response to the severe impact on local livelihoods caused by designation of the Knuckles Range Man and Biosphere Reserve (KRMBR), IUCN in collaboration with the Forest Department initiated the this project in January 2002. The main objective was to promote community participation in forest conservation by developing alternative sources of income, which relied on conservation efforts. The buffer zone communities in the KRMBR were the main targets. Under the project sustainable

agricultural practices were introduced and income generating conservation supporting initiatives (e.g. eco-tourism) were undertaken based on a principle of benefit sharing and local participation. Sustainable agricultural practices in homestead gardening were promoted mainly focusing on the cultivation of high-value crops such as pepper and fruits.

Over the course of the project (2-years) seven minor irrigation structures were built in accordance with local priorities, and vocational training programmes, for young villagers, focusing on tourism related activities such as tour guiding have been conducted. Through the project, slash and burn practices have to a large extent been abandoned in favor of long-term standing crops such as pepper and fruits, and the construction of minor irrigation tanks have enabled farmers to intensify their paddy cultivation as well as farm a variety of vegetables. Within the KRMBR a number of environmental services are being provided in the form of biodiversity conservation, carbon sequestration, watershed protection and landscape beauty.

When considering developing PES and environmental service markets, the KRMBR holds a great potential, especially in relation to eco-tourism. Local awareness about the recreational value of biodiversity has greatly improved with the project, and communities have experienced the income generating opportunities associated with tourism. The youth has been trained as tour guides and infrastructure development has provided easy access to the area. The project has promoted the idea of buffer zone communities acting as environmental guardians. Targeting tourists visiting the area for financial contributions to sustain the provision of recreational services, was one of the first steps in developing a PES scheme for the KRMBR. However, there is a presumption that most services provided by a forest are complementary and that increased investment in one service will have positive spin-offs for others.

Case 7: Climate Change Enabling Activity Project

The second phase of the Climate Change Enabling Activity Project (CCEAP) was initiated in April 2001, under the Ministry of Environment and Natural Resources, to facilitate the process of Clean Development Mechanism (CDM) project development, enhance institutional capacity and assist in the preparation of the Second National Communications Strategy on Climate Change.

The objectives were to access the impacts of climate change on the different sectors of the national economy i.e. by conducting vulnerability studies; to develop an adaptation strategy; and to recommend mitigation measures needed to offset and limit potential impacts of climate change. Capacity building activities focused on strengthening the expertise of the Ministry of Environment and Natural Resources, which is the national designated authority for CDM, and by establishing a Climate Change Secretariat, a National CDM Expert Committee, as well as preparing a CDM policy. According to the United Nations framework convention on climate change (UNFCCC), only afforestation and reforestation projects are eligible for CDM.

Projects related to agro-forestry, reforestation, afforestation and plantations for industrial and biomass production purposes, are promoted as providing poor households with an opportunity to participate in forest management while potentially gaining financial rewards through carbon trade. However, there is still a lack of capacity in the area of CDM and carbon trade in Sri Lanka and establishing a formal market for carbon credits is still in its very initial stage. Private sector initiatives Developing markets for environment services typically involves a wide range of stakeholders including state agencies and institutions, non-governmental organizations as well as local communities.

In Sri Lanka several private sector initiatives in the field of natural resource management have emerged and are presented below. Private plantation initiative Created in 1988, Help Green (Pvt.) Ltd., has developed an environmentally friendly concept of commercial forestry, where private investments are attracted by offering substantial economic returns from timber sales as well as contributing towards environmental health. Investors can according to Help Green make money while safeguarding the environment – a combination attractive to many people. To date 1,200 acres of teak are being successfully grown in their plantations, located in the dry zone of Anuradhapura, Dambulla and Anamaduwa, an area expected to increase to 10,000 acres within the next 10 years. Help Green's overall role is to provide management services during the 20-year investment period and to secure high quality timber and good yields. As compensation for their services Help Green charges an annual management fee as well as approximately USD 10,000 per hectare teak plantation. The payment covers plantation costs, insurance against crop failure and a 20-year land lease. Each plot of land sold is initially planted with 140 teak seedlings and after 20 years it is estimated that 100 fully-grown teak trees remain, which are eligible for sale, providing some 2,000 cubic feet of wood. In their marketing Help Green emphasizes the environmental benefits associated with their operations, mainly afforestation of degraded areas and facilitating the provision of environmental services. By promoting an eco-friendly approach,

The Kandyan Home Gardens (KHGs), found around Kandy in the central highland of Sri Lanka, are traditional systems of agro-forestry, which over time have evolved into unique ecosystems providing numerous goods and services. KHGs cover as much as 40% of the Kandy District and primarily contain perennial and semi-perennial trees, shrubs and as many as 30 different crops. An economic assessment conducted by Kotagama H.B. et al revels that the KHGs form an important part of local livelihoods and yield both cash crops and products for subsistence use. Furthermore, through the sustainable management of these areas a wide range of biodiversity is conserved, and harvest pressure on natural forests is reduced. Services in the form of soil conservation, carbon sequestration and recreation are also provided by these man-made ecosystems.

Organizing producers into e.g. farmer groups becomes important in order to benefit from economies of scale. Bio Foods (Pvt.) Ltd is private company engaged in voluntary mechanism. Individual farmers can benefit from engaging in the production of organic tea and spices through this programme. Lanka Organic Agricultural Movement (LOAM) as well as government initiatives to promote organic agriculture provide opportunities to expand and develop new initiatives to "green"

agriculture in Sri Lanka. A National Expert Committee on organic agriculture as already been established by the Ministry of Environment and Natural Resources and setting up an Organic Product Promotion and Development Center (OPPDC) has been proposed. A number of international certification systems are used in Sri Lanka and several fair trade schemes, such as Max Havelaar, are being promoted. Also the adaptation of ISO standards under the Sri Lanka Standards Institute (SLSI) form part of the basis upon which companies seek guidance on implementing quality and environmental management approaches. As a consequence of certification a number of benefits have been reported by the 14 companies e.g. increased market opportunities, cost savings, compliance with environmental regulations, improved customer and stakeholder satisfaction, better cooperate citizenship and reduced environment impacts.

Case 8:

Modelling soil erosion and hydropower linkages of Rantambe reservoir, Sri Lanka: towards payments for ecosystem services

Uma Oya watershed that feeds Rantambe reservoir in Sri Lanka is severely affected by soil erosion due to the inappropriate land-use practices. This study assesses the impact of soil erosion on reservoir sedimentation and the economic losses by adopting Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) Sediment Retention model and investigates mechanisms available for minimising the impacts (Uduayakumara and Gunawardena, 2022). Data sources included digital map data from GIS, household questionnaire survey and field level data. Three land-use interventions were modelled to determine changes in sedimentation against the current land use. Three interventions available for the power generation facility (PGF) to mitigate loss of hydropower were analysed against each land-use intervention. Mechanisms available for implementing a payment for ecosystem service were also assessed. Project identifies that soil and water conservation (SWC) intervention for the watershed reduces the soil erosion rate by 23%, which results in total savings of LKR 88.7 million (PV). Implementing SWC intervention by farmers requires that they are paid the full cost. Since payment from the PGF is not adequate for this, an additional payment from the fertiliser importing authority of the country is proposed. The study suggests further full scale multi-dimensional analysis that combine multitude of agencies along with temporal dimensions to arrive at the best solution. This study highlights the below payment values for the potential watershed services (Table 1).

Table 1: Costs and benefits of Rantambe reservoir proposed PES scheme

Costs and benefits of PES scenarios	Annual (LKR)	Present value (LKR)
PES Scenario I-payment from PGF to farmers		
Payment for the land owners to implement SWC in the crop land area from savings under dredging intervention of PGF	4,467,210	88,657,985
Cost of SWC measures incurred by the farmers	905,548,020	5,348,381,442

Net benefit of implementation of PES to the farmers PES Scenario II-payment from PGF and fertiliser importation authority to farmers	− 901,080,810	− 5,259,723,457
Payment for the land owners to implement SWC in the crop land area—from savings under dredging intervention (DR)	4,467,210	88,657,985
Cost of SWC measures incurred by the farmers	905,548,020	5,348,381,442
Payments for the farmers for the nutrient savings in their farm land provided by fertilizer importation authority	330,751,944	6,573,973,054
Net benefit of implementation of PES to the farmers PES Scenario III-payment from PGF and awareness creation among farmers on nutrient savings on the farmland	(570,328,865) - 1st year 268,187,235 - 2nd year	1,314,249,597
Payment for the land owners to implement SWC in the crop land area—from savings under dredging intervention (DR)	4,467,210	88,657,985
Cost of SWC measures incurred by the farmers	905,548,020	5,348,381,442
Benefit for the farmer from adopting SWC in terms of nutrient savings	330,751,944	6,573,973,054
Net benefit of implementation of PES to the farmers	(570,328,865)—1st year 268,187,235–2nd year	1,314,249,597

Case 9: Redirecting value from stored water to protect watersheds in Sri Lanka

This study identifies the below actors and benefits as well as Suppliers from upper watersheds: Government owned lands – forests and privately owned farm lands (Estimated by Prof. Prasanthi Gunwardena). Study shows that it is always cheaper for the Electricity Board to generate hydropower than thermal power and invest in the upper watershed conservation than dredging reservoirs as it can

- Avoid foreign exchange spending on coal /oil import
- Avoid air pollution from thermal generation
- Avoid cost of dredging
- Avoid lost electricity

Therefore, the study highlights that payments need to be arranged among farmers and Electricity Board/ Minihydro operators

- Payment for land owners to implement soil and water conservation in crop lands
- Benefits to the Electricity Board
- Savings from avoided Dredging
- Savings from avoided thermal generation and costs of air pollution
- Benefits to the minihydro operators

- Sustained water levels around the year
- Avoided thermal power

- Payments from global community Savings due to avoided social cost of carbon

It brings more water to the downstream

Avoids costs of additional chemicals for high level of sediments, additional water treatment costs, avoids burden of salinity. Therefore, payments could be arranged among Water Board and farmers. Additional benefits would include; additional income for farmers, reduced levels of artificial Fertilisers, reduced levels of chemical applications, health benefits for the nation, global benefits from carbon fixing.

There have been a few notable proposed PES cases in the energy sector of Sri Lanka. Electricity power generation in Sri Lanka depends basically on three main sources: thermal oil, coal power, and hydro power. Out of the total electricity generation over 14,000 GWh as in 2016, 31 percent was from thermal oil, 36 percent from coal and, 30 percent from hydro power. The average unit cost of generating 1 KWh of electricity is LKR 26.59 from thermal oil, LKR 14.00 from coal power and, LKR 3.27 from hydro power. While the Ceylon Electricity Board (CEB) - a state-owned enterprise generates 77 percent of the total electricity generation, small-scale private power producers (PPPs) generate 23 percent which is purchased by the CEB at fixed price. The Public Utility Commission of Sri Lanka (PUCSL) - an independent regulatory body, regulates the electricity prices for the consumers.

An introduction of PES in energy sector is considered important because power generation has significant negative implications on the country's biodiversity and ecosystem services whilst the condition of watersheds also influences power generation efficiencies especially in hydropower. In addition, PES appears to have a positive impact on resolving some of the internal issues in the energy sector that affects the cost advantage and competitiveness of the national economy.

Case 10: Carbon Trading projects by the Rubber Research Institute of Sri Lanka

A Carbon Trading project was initiated by the Rubber Research Institute of Sri Lanka with the objective of obtaining Voluntary Carbon Standards (VCS) for new rubber cultivations scheduled to be planted under the Smallholder Tea and Rubber Revitalization (STaRR) Project in Uva and Eastern provinces (Munasinghe and Rodrigo, 2021). This project which is in the validation stage, listed in the Verra registry focuses on carbon trading in the voluntary market with 3,000 ha of newly planted rubber in Monaragala and Ampara districts of Sri Lanka. (https://registry.verra.org/app/search/VCS/All%20Projects). It is expected to generate about 1.7 million carbon credits, and financial gains will be utilized for community benefit of farmers and also for further expansion of rubber cultivation in remote areas of Sri Lanka.

Case studies proposed for the Energy sector

Energy sector case 1: Payment for watershed management of a mini-hydro power plant

There are more than 150 Mini-hydro power (MHP) producers in the country who generates electricity from their small-scale power plants using the natural water streams. They sell their product to the national electricity grid owned by the Ceylon Electricity Board (CEB) at a fixed price. However, MHPs operates at extremely low plant factor due to gradual decline in water quantity and quality

largely due to the deterioration of the watershed ecosystems. As a result, more than two-thirds of the MHP plants in the country operates with less than 30 percent plant factor. The watersheds can be managed better if the communities and their activities in the upstream areas of the power plants collaborate in maintaining the quality of watersheds.

In the proposed project, a private MHP company was to be selected on voluntary basis. The finance solution will result in an avoiding future costs of ecosystems management and a mobilization of resources for investing in biodiversity. While the buyers of the ecosystems services are expected to generate and mobilize finances, the sellers are expected to manage the ecosystem services better. The buyers are the MHP producers while the sellers are the communities maintaining the watersheds.

MHP operators sell electricity to CEB on average at Rs. 16.00, resulting in a lucrative profit margin of over Rs. 12 per KWh, given the cost of power generation is Rs. 3.27 on average. A payment of LKR 0.1/KWh (10 Cents/KWh) electricity generated will reduce the profits only marginally. MHP, selling 100 GWh electricity to CEB, will mobilize LKR 10 million (US$ 62,500) annually in order to pay for ecosystem services, but will benefit from the better management of watershed for secured power generation as well. The funds that are mobilized from hydro-power generation were to be diverted to the communities who would manage the biodiversity in the upstream areas. Thus, a PES mechanism in the power generation sector is of beneficial to the nation not only with better management of the biodiversity, but also with its positive impact on the living standards of the communities, improved business performance of the MHP operators and, reduced energy cost to the economy.

Energy sector case 2: Payment for watershed management for hydropower generation at Moragahakanda

The finance solution of this project was to ensure the supply of watershed services at the Moragakahanda reservoir for sustainable hydropower generation through a PES scheme.

The poor land use management and the economic activities in the catchment areas of water reservoirs which resulted in a biodiversity degradation continue to affect the sustainability of water quality and quantity in the reservoirs and, thereby the long-term hydro power generation. The price of electricity based on hydropower does not reflect the upstream externality. Therefore, maintaining the upstream ecosystems is a condition for electricity generation from hydropower which also derives economic and financial benefits to the country.

Under a PES scheme, a nominal fee is added to the cost of electricity in the case of hydropower generation. Average electricity tariff does not vary with the source of power generation so that increase in hydropower generation does not alter the short-term tariff rate to the electricity users. The additional finances mobilized through the mechanism can be diverted to the communities and agencies in the catchment areas as a payment for better management of the ecosystems there which would guarantee the sustainability of water quality and quantity in the steams and reservoirs.

The PES scheme was aimed at ensuring better management of the ecosystem services on the one hand and, improving the price efficiency in power generation in Sri Lanka. Both are national policy objectives, though they are under the mandate of different government agencies. PES mechanism is expected to bring these government agencies together for a national cause.

A payment of LKR 0.10 per KWh (10 Cents/KWh) electricity generated from hydropower will save LKR 23.00 on electricity generated from thermal oil; accordingly, for each 100 GWh electricity generated will mobilize LKR 10 million (US$ 62,500) annually in order to pay for ecosystem services. Therefore, PES fund can mobilize resources not only from tariffs on hydro power, but also from savings on thermal power for investing in ecosystems.

The sellers of PES are the plantations, organizations, farmers and communities in the upstream catchment areas to conserve biodiversity. The buyers are the users of water in the downstream areas, while the most feasible buyer would be the CEB which operates the hydropower plant. The mediator which connect the two parties would be the owner of the water reservoir which is the Ministry of Mahaweli Development and Environment - the agency that can operate the PES scheme. The study is undertaken for the regulatory body of the utility prices - the Public Utility Commission of Sri Lanka (PUCSL). Therefore, PES fund can mobilize resources not only from tariffs on hydro power, but also from savings on thermal power for investing in ecosystems.

Energy sector case 3: Payment for negative externalities of coal power generation

This case study was piloted to establish a mechanism to arrest negative externalities of coal power generation under the "polluter pays" principle.

Coal power is generated in Sri Lanka from a single coal power plant located in Norocholai, Puttlam district which has 900 MW installed power. Since the beginning of the operation of the coal power plant in 2014, its negative externalities with harmful effects on terrestrial and marine biodiversity and ecosystems as well as their health hazards became a source of controversy.

While the proposed pilot projects on hydro power generation are concerned with PES schemes, as a supportive activity the study on "paying for negative externalities" is proposed for extending BIOFIN assistance. The study is aimed at estimating the cost of externalities of the coal power generation in Sri Lanka's coal power plant that affects the biodiversity and ecosystems and at incorporating its costs to the power generation under the "polluter paying principle".

The study was proposed and undertaken by the Public Utility Commission of Sri Lanka (PUCSL) - the independent regulatory body of the utility sector. The study aimed at designing a payment principle for negative externalities of coal power generation and at recommending necessary amendments to the related policies and regulations.

The finance solution was expected to result in a generation of finances. An addition of LKR 10 Cents per KWh to coal power generation cost would raise cost of coal power marginally, but it will be still much cheaper than thermal oil power. As coal power generation is about GWh 5000 a year, the additional LKR 10 Cents per KWh is estimated to generate LKR 0.5 billion (approximately US$ 3 million) annually. It is a significant amount of finance mobilization to undertake corrective measures to conserve biodiversity by reducing the negative externalities of coal power generation.

The proposed solution will result in a financing system with multiple mechanisms of paying for negative externalities. These include partly compensation payments, partly restoration payments and investments in cleaner production that mitigate future pollution.

2. Enabling policies, regulations, and national programmes for ecosystem services provisions and financing schemes

For payment for ecosystem services approaches to be successful in practice, and for them to be acceptable to decision-makers, it is essential that the institutional, legal and policy structures required to support their implementation are identified and clearly articulated. This section therefore aims to review enabling policies, regulations and national programmes for sustainable implementation of PES and PES-like schemes in Sri Lanka.

Payments for ecosystem services must be supported by legally-binding agreements. In order for those agreements to be effective, the rights of the parties – whether they are individuals, households, communities or organizations – to use, manage, and benefit from the resources that provide the services must be clearly established. National laws, regulations and circulars provide the required legal basis for all aspects of payments for ecosystem services: defining the ecosystem services themselves; defining the capacity of potential parties to enter into agreements; and defining the rights of all parties in the resources and services and the benefits they provide.

2.1 Biodiversity and Ecosystem services conservation in national regulatory framework

National regulatory framework which includes the National Environmental Act, No.47 of 1980 and its amendments, Environment Conservation Levy Act, No. 26 of 2008, Fauna and Flora Protection Ordinance and its amendments, Forest Ordinance No. 16 of 1907 and its amendments, Plant Protection Act No. 35 of 1999 ensures penalties, finance and the enabling environment for implementation of financial schemes for biodiversity protection (Table 2,3,4). None of these laws, however, addresses ecosystem services in any detail or regulates their valuation and use.

Table 2: Enabling Policies and Challenges

Policy	Features	Challenges
National Environmental Action Plan 2022-2030 -	Values of biodiversity and ecosystem services are absorbed into regional/ national financing mechanisms and voluntary payment and rewarding mechanisms for biodiversity and ecosystem services (BES) are adopted	The act clearly sets out the importance of a PES scheme and the mechanism for implementation. A proper legal framework could strengthen the capacity to move towards agreements with better calculate local and global gains.
Environmental Conservation Levy act	Provide for the imposition of an Environment Conservation Levy and taxes on specified items owned by consumers, on specified items imported into or manufactured in Sri Lanka or specified services provided in Sri Lanka, which are likely to have a harmful impact on the environment, to provide for the collection and recovery of such Levy	Implantation and imposition of PES and PES-like models/mechanisms are not delineated. However, investments in the environmental sector could be financed from user payment schemes such as payments for ecosystem services or with economic and market-based instruments like green taxes (levies), tradable permits based on the polluter pays principle.
National Policy, Strategies and Institutional Framework for Water Resources Development, Conservation and Management	The main objective of the policy framework is to encourage integrated water resources development and management, to ensure that the national water resources are conserved, efficiently managed and equitably allocated among all stakeholders to meet the needs of the society and the environment endeavor to sustainable economic development of the country.	Hydropower contributes significantly as a renewable source to the energy sector. In 1990's contribution of hydropower to this sector was 100%. However, it was declined due to introduction of other nonrenewable resources. Even though the share of hydropower 22% today, many new major and mini hydropower projects are under planning and implementation stage by now. Under these circumstances, the noteworthy shortcoming currently observed in implementation of a PES is the non-availability of a suitable institutional and a legal framework to address the above challenges. Necessity of an organization responsible for overall supervision, management and control of water resources planning, development and conservation in the country is felt more than ever. Development of natural resources on

		economic considerations and social benefits of the present generation cannot be isolated from a consideration of the aspirations of the future generation. A well formulated policy is therefore a necessity of the present and of the future.
National Water Resources Policy and Institutional Arrangements	The key objective of this policy is to provide water entitlements and water tariff scheme for the irrigation water to secure against overuse of water and assure equity among the users, to allocate water resources based on IWRM principles.	Public opposition for pricing of water could be a concern in the long run. Ignorance of historical and cultural aspects of irrigation water. Lack of communication with the stakeholders. Lack of transparency of the policy due to language can impede PES implementation which are not covered under policy framework. Policy must be amended to give more attention to the users which have a higher return for the water (i.e., irrigated paddy cultivation gives a low return for the water). Frequent changes in the ruling party of government, the ministries responsible to changes can affect sustainability of the schemes
National Policy on Protection and Conservation of Water Sources, their Catchments and Reservations in Sri Lanka	The main objective of this policy is to protect and conserve all the water sources their reservations the conservation areas and immediate catchment areas to ensure the existence of the water sources in Sri Lanka.	Certain limitations and challenges that can impede the design and implementation of PES schemes were identified in the policy framework; the boundaries of the areas with water sources, reservations of water ways, catchments of the reservoirs / tanks have not been identified and marked physically on the ground. There are also issues in enforcing present laws, rules and regulations. Institutional problems regarding the conservation of water sources are yet to be addressed. Misuse of land allied to the areas related to water sources, reservations of water ways and catchments of reservoirs / tanks and other activities that cause water pollution must be addressed. Encroachments made for various activities related to the areas that needs to identified. Lack of public participation in

		protecting the areas related to the water sources such as catchments are not highlighted in policy. Unavailability of sufficient resources with authorities concerned to take necessary action to conserve the areas related to water sources, reservations of water ways and catchment of reservoirs / tanks. Lack of information / data on the activities take place at present in the catchments. It is important to determine and demarcate the limits / boundaries of water sources and their catchments and legally declaration of such areas. The government must take action to conserve the lands in the areas demarcated as water sources and their catchments and related reservations by adopting suitable strategies taking in to account their present ownership and use.
National Policy for Rural Water Supply and Sanitation Sector	Policy aims to give additional focus on more community participation including CBOs, NGOs, and private sectors for water supply and sanitation sector.	Policy focused on the provision of people-centered and demand-driven water supply and sanitation to rural areas (i.e., which population is less than 6,000 people in a Grama Niladari (GN) division (smallest administrative boundary in Sri Lanka). It is also mentioned that women empowerment in decision-making on water resources management. GOSL would facilitate the formulation of the legal framework with three institutions (i.e., Provincial Councils, NWSDB, and CBO) and necessary provisions within which Provincial Council and the Local Authorities. However, the monitoring evaluation is not specified leading to not realizing the expected results.

Table 3: Policy Constraints affecting PES implementation in key areas

Policy/Area	Challenges
Forestry / plantation /Biodiversity management/ Conservation	A potential problem identified for the implementation of PES is weak ownership and tenure rights of forest land. Forest tenure must be clearly defined and recognized and the ecosystem service provider must hold the rights of the service as a pre-condition for PES. This is because if property or use rights are unclear, the buyer of the service cannot define the conditions of payment. This condition is strongly connected with forest ownership. Changes in land management rules and regulations may also have a significant impact on ecosystem service delivery and the PES. These must be clearly resolved in policies. There is also the concern with plantations as new income sources is particularly difficult for small landowners who may lack the resources for developing the necessary marketing skills, cover their administrative burdens, etc. This calls for special attention and possibly additional support from governments, landowners and NGOs.
Watershed management	It is important to clearly define how inappropriate use of land can be avoided in the areas related to water sources through the preparation of land use plans. Policy must highlight actions to rehabilitate the degraded lands in the areas related to water sources. Identify amendments needed in existing laws and legislations and introduce new laws with regard to the protection of the areas related to water sources, if necessary. It is necessary to pay special attention on protection and conservation of the areas related to water sources when preparing all the development plans including regional development plans and include such plans in the development plans. Suggested to make compulsory the adoption of conservation based land use patterns suitable for environmentally sensitive areas and the lands for the protection and conservation of the areas related to water sources. Not to release the state lands in the areas related to water sources, identified for conservation for any purpose other than the protection of such lands. It is essential that policy makers follow a holistic approach in decision making.
Land use planning	Land use and property rights are not very clearly specified at the local level. There are numerous cases in which multiple stakeholders claim ownership over the same piece of land. Others

	where land protection areas have been occupied by private landholders, and still others where several use and property rights overlap. These must be looked in to.
Agricultural practice improvement	Besides providing funding to land users, PES schemes may also provide non-monetary benefits such as training, specialist advisors, infrastructure improvements or technical support. Furthermore, PES schemes bridge the interests of landowners, resource users and nature protection, and can therefore be seen as an efficient tool to address a set of problems. Rural communities can benefit from increased knowledge of sustainable resource use practices that are usually connected to PES through the provision of training and technical assistance. However, it is not well understood whether or not these potential benefits are realized in practice, or how they depend on scheme design in policies.
Climate Change	Revenue for PES can also be generated through a voluntary payment programmes. Individuals and companies wishing to further their CSR programmes and/or reduce their carbon footprints. Local watershed compensation arrangements may play a vital role in strengthening the capacity of local populations to climate change adaptation. Throughout history, how to manage climatic variability has been a constant worry for local rural populations. If, as a result of the phenomena associated to climate change, this variability is enhanced, the quantifiable risks are increased and the non-quantifiable uncertainty has to be included in natural resource management policies as also outline by Doombos (2009).
Industrial usage of water	Existing policies do not provide adequate information for safeguarding the interests of consumers and fundamental rights as referred to in the constitution.
Soil conservation/ land degradation	Whilst the emphasis of PES has always been on improving the quality and sustainability of environmental systems, it would be easy to label the contributions of companies as conscience money, paying for irreplaceable environmental damage. It is also sometimes argued that PES schemes can be unfair and can provide perverse incentives where payments go to those who have degraded or threaten to degrade their land, rather than those already sustainably managing it. These must be emphasized in policies.

Table 4: Ecosystem services recognized in existing regulatory and policy framework

Ecosystem Service	Legal Framework Law/Policy/Act	Supporting Content
Biodiversity Protection	National Environmental Act No. 47 of 1980	National Environmental Act No. 47 of 1980 and its amendments emphasizes the identification of biodiversity values. In addition, there are provisions in this act to designate areas as Environmental Protection Areas, in areas of value in biodiversity.
	The national policy framework 'Vistas of Prosperity and Splendour' (2019) highlights the importance and strategies for biodiversity protection	The national policy framework states the importance of a sustainable environmental policy, where biodiversity will be protected, conserved and restored, ensuring the increase national forest cover by 30%. The wise use as well and planned and systematic integration into other sectors are also envisioned in this policy.
	National Policy on Invasive Alien Species (IAS) in Sri Lanka Strategies and Action Plan (2016).	The 'National Policy on Invasive Alien Species (IAS) in Sri Lanka Strategies and Action Plan' (2016), implemented by the BDS, MoE, envisages a comprehensive, coordinated, and efficient system, with adequate laws to protect both natural and human-made aquatic, marine and terrestrial ecosystems of Sri Lanka from risks associated with IAS and provides guidance for actions related to IAS.
	National Environmental Policy (2003)	
	National Policy for Conservation and Sustainable Utilization of Mangrove Ecosystems in Sri Lanka (2020)	National Policy on Access to Biological Material and Fair and Equitable Benefit Sharing' (2020) aims to ensure the fair and equitable sharing of benefits arising from biological material, while securing ownership of such material and associated traditional knowledge among the people of Sri Lanka, with appropriate public participation, to support conservation and sustainable use of biological material in the country.
	National Policy on Access to Biological Material and Fair and Equitable Benefit Sharing' (2020)	
	National Policy and Strategies on Traditional Knowledge and Practices related to Biodiversity (2020)	Coast Conservation Act No. 57 of 1981 as amended mandates involvement in natural resource conservation and management, including conservation and management of mangroves and seagrass meadows in the coastal zone. The 'National Biodiversity Strategic Action Plan' (NBSAP) (2016-2022) is based on the following five strategic objectives: ensuring the long-term conservation of biodiversity; promoting sustainable use of biological resources; conserving agrobiodiversity; promoting equitable sharing of benefits from biodiversity; and improving human well-being through an ecosystem approach.

Forest Protection	Fauna and Flora Protection Ordinance (1937)	Fauna and Flora Protection Ordinance (1937) provides legal protection for wildlife and plants in Sri Lanka, regulating activities such as hunting, trade, and habitat destruction.
	National Wetland Policy	Sri Lanka has a National Wetland Policy aimed at conserving and managing wetlands, which are critical habitats for biodiversity.
	Environmental Impact Assessment (EIA) Regulations	The EIA regulations in Sri Lanka require the assessment of potential impacts on biodiversity for development projects and activities.
	National Forest Policy (1995)	Sri Lanka has a National Forest Policy aimed at sustainable management and conservation of forest resources, promoting afforestation, reforestation, and biodiversity conservation.
	National Conservation Strategy (1988)	
Watershed Protection	National Environmental Act No. 47 of 1980:	This act provides the legal framework for environmental conservation and management, including watershed protection.
	National Policy on Water Resources Management in Sri Lanka:	This policy aims to ensure sustainable water management practices, including protection of watersheds.
	Mahaweli Authority Act No. 23 of 1979:	This act established the Mahaweli Authority of Sri Lanka, responsible for the development and management of the Mahaweli River Basin, including watershed protection measures.
	Forest Conservation Ordinance No. 16 of 1907:.	While not specifically focused on watershed protection, this ordinance is crucial for protecting forested watersheds, as forests play a critical role in maintaining water quality and regulating water flow.
	National Water Supply and Drainage Board Act No. 2 of 1974:	This act establishes the National Water Supply and Drainage Board, responsible for providing safe drinking water and managing water resources, including watershed protection

Carbon Sequestration	National Climate Change Policy:	Sri Lanka has a National Climate Change Policy aimed at addressing climate change impacts, including strategies for carbon sequestration and mitigation.
	Forest Conservation Ordinance	Sri Lanka has laws in place to protect forests, which play a crucial role in carbon sequestration.
Water and hydroelectricity provision	National Water Supply and Drainage Board Act:	This act establishes the National Water Supply and Drainage Board (NWSDB) responsible for providing water supply and drainage services across the country.
	National Water Policy	Sri Lanka has a National Water Policy that provides a framework for the sustainable management and development of water resources, including provisions for water supply and hydroelectricity generation.
	Environmental Impact Assessment (EIA) Regulations	These regulations require the assessment of potential environmental impacts, including those related to water resources, for development projects, including hydroelectricity projects.
Tourism development	Tourism Act	The Tourism Act of Sri Lanka provides a legal framework for the regulation and promotion of tourism in the country. It covers various aspects such as licensing of tourism establishments, tourist guide registration, and tourism promotion activities.
Climate change mitigation & adaptation	National Climate Change Policy	Sri Lanka has a National Climate Change Policy aimed at addressing climate change impacts, including strategies for mitigation and adaptation across various sectors.
	Climate Change Adaptation Framework	Sri Lanka has developed a Climate Change Adaptation Framework to guide adaptation actions in vulnerable sectors such as agriculture, water resources, coastal zones, and human settlements.

	Environmental Impact Assessment (EIA) Regulations	Sri Lanka's EIA regulations require the assessment of potential climate change impacts for development projects, helping to integrate climate considerations into decision-making processes.
Forest management & conservation	Forest Conservation Ordinance: National Forest Policy	The Forest Conservation Ordinance of Sri Lanka provides legal framework for the protection and management of forests, including provisions for forest reserves, protection of wildlife habitats, and regulation of timber harvesting and forest-related activities. Sri Lanka has a National Forest Policy aimed at sustainable management and conservation of forest resources, promoting afforestation, reforestation, and biodiversity conservation. The 'Forest Ordinance No. 16 of 1907' also amended in 2009, implemented by the FD, provides for the declaration of three types of protected areas: Conservation Forests, Reserved Forests (Forest Reserves) and Village Forests
Rural Livelihoods	Social Security Policy Welfare Policy Housing Policy Child Protection Policy Elderly Care Policy Food Assistance Policy Disability Support Policy Banking Regulation Policy	Ensures welfare of communities and benefit sharing.
REDD+	The National REDD+ Investment Framework and Action Plan (NRIFAP) (2017)	This framework for REDD+ identifies 13 Policies and Measures within three key policy areas: i) Forests, Wildlife and Watershed; ii) Land Use Planning and iii) Other Forested Lands. Many of the Policies and Measures – improving forest law enforcement and monitoring; scaling-up of forest boundary surveys; demarcating and declaring reserves; restoring degraded forests and wildlife ecosystems; strengthening sustainable forest management; supporting the inclusion of Strategic Environmental Assessment; and strengthening the protection of other non-state forested lands

3. Potential for Strengthening Climate Resilience of Subsistence Farmers and Agricultural Plantation Communities in the Knuckles Catchment through a PES mechanism

3.1 Implementing PES Schemes in the Knuckles region

The knuckles regions as highlighted in some of the case studies above has a huge potential for implementing PES schemes. With an appropriate legal, institutional and policy framework, involvement of the right stakeholders, calculated distributional impacts and equity concerns, a PES scheme could bring about environmental, social and economic gains to Sri Lanka. Some specific positive gains are listed below

- Improvements in water quality and quantity achieved through PES schemes may assist in areas where climate change is predicted to result in water shortages.
- PES schemes with a revegetation focus may contribute to climate change adaptation by promoting enhanced water storage as well as mitigation through increasing carbon sequestration.
- Provide an income buffer and a source of income diversification, and thus aid communities in increasing their resilience to climatic shocks.
- Schemes that are intended to increase biodiversity (e.g. forests, wetlands, home-gardens, marshes) may increase landscape connectivity and, hence, improve the potential for plant and animal species to adapt to climate change.
- PES schemes such as those involving flood plain restorations provide synergies with climate change adaptation
- Restore vegetation on degraded slopes reduce the effect of projected increases in extreme rainfall events.

There is a huge potential for eco-tourism interventions around the Knuckles Man and Biosphere Reserve As described in the previous section, the establishment of the Knuckles Man and Biosphere Reserve has imposed certain regulations on cardamom cultivation and other harmful anthropogenic activities undertaken by buffer communities. Instead, efforts have been made to improve local awareness of the value of conservation, and to involve adjacent villages in forest management and eco-tourism activities. However, villages located in the Knuckles periphery are still heavily dependent on forest resources for their survival, and many are engaged in paddy cultivation and practice slash and burn. In an attempt to identify mechanisms and opportunities whereby communities adopting sustainable land use practices could be compensated for their efforts, a series of interviews were conducted with officers working for the District Forest Department. Also local villagers (laymen, farmers and women) from four villages inside the buffer zone were interviewed to gain knowledge about their socio-economic conditions and experiences with forest management. The four villages are home to about 400 families (2,200 people).

Overall paddy cultivation was reviled as the primary source of income with pepper occupying second place. Every household has a home garden in which pepper, ginger, vegetables, and fruits are grown. Some villagers are employed as tourist-guides and others produce handicrafts for tourists to buy. Given the poor developed infrastructure and lacking public transport, market access is cumbersome and farmers have to rely on outside retail buyers offing very low prices for their products. The construction of an 8 km road linking Mimurei to the economic center of Dambulla was therefore a top priority for many farmers.

3.2 Mechanisms to transfer part of these payments to the surrounding communities

If sustainable forest management is to prevail, buffer zone communities need to be provided with adequate incentives. Insecure land rights and the continued high dependence on forest resources are some of the challenges that would have to be addressed if markets for environmental services, especially recreation, are to succeed. Organic production of tea and spices in the central region Successfully producing organically grown crops like tea and spices is, in Sri Lanka, where producers are small highly dependent upon the ability to reduce transaction costs and obtain certification. Bio Foods (Pvt.) Ltd. has been successful in this regard, by uniting their suppliers in groups (benefiting from economies of scale) and through a strategy of differentiating and diversifying their products away from competitors. Bio Foods (Pvt.) Ltd is now perceived as the largest exporter of high-quality organic tea and spices. So far several certification schemes are utilized, including: fare trade, safe quality food standards and ecolabeling.

Reducing Deforestation and Forest Degradation programmes (REDD+), brings about another potential for payments for ecosystem services to conserve primate habitat by paying landowners for the preservation or enhancement of ecosystem processes, such as carbon storage, water provision, or pollination in the area. At present, payments to preserve the carbon stock in forests have received most attention because of their potential as a cost-effective climate change mitigation strategy. The potential of these initiatives for biodiversity conservation is also gaining recognition.

Initiatives such as Analog forestry (Senanayake, 2011) also has the potential for carbon, oxygen markets as well as Biocurrency schemes that could bring huge amounts of positive economic gains to Sri Lanka

The below suggestions could be made upon focus group discussions, stakeholder analysis and review of existing policies.

- Clearly identify PES goals and objectives is imperative
- Remove perverse incentives - coherent PES policy requires other prevalent market distortions to be removed
- Clearly defined and enforced property rights – land rights
- Ensure sufficient and long-term financing for PES

- Target and differentiate payments (via spatially explicit cost-benefit analysis) to enhance cost-effectiveness rather than uniform payments
- Additionality, leakage and permanence should be addressed
- Performance-based, voluntary payments with adequate monitoring, evaluation and reporting.

- Policymakers should consider creating a participatory approach to engage all related stakeholders in a dialogue and should facilitate public participation in decision-making, including at the local level, where most action takes place, thus building trust, ensuring ownership and improving cooperation. At the same time, public notification and public participation should be ensured already at an early stage of PES development, when all options are open and effective public participation can take place.

- A more multidisciplinary holistic approach must be taken to design a sustainable PES. Multidisciplinary teams should be set up and local consultations organized, both involving user groups and other stakeholders, to draw up such a shared vision, embedded in strategies for ecosystem protection and help with implementing water management plans.

- Involving all stakeholders, including women, ensures ownership, upstream/downstream solidarity and the integration of local experience and traditional knowledge. Thus benefits for local populations, including indigenous people, traditional knowledge and effects on economic and social development can be better demonstrated.

- It was identified thar non-monetary incentives for the community can have a greater impact on the sustainability of the scheme in the long run. Therefore, it is important to understand the perception and requirements of the users.

- It is important to recognize that the private sector can make an important contribution, not only financially but also by sharing its wealth of practical experience as well as welfare contributions. Commercial enterprises are important buyers of ecosystem services, as when hydroelectric companies buy through payments of user fees. They play intermediary roles and provide ancillary services.

- Competent NGOs and the private sector should be encouraged to participate. Joint bodies thus become a platform for dialogue and joint action to ensure the protection and restoration of ecosystems and can better serve as a forum for the exchange of information on existing and planned uses of water and related activities.

- The government should develop explicit policies and strategies for the development and implementation of PES schemes in their diverse forms in the water, environment/nature, agriculture/forestry and (public) utilities sectors. These policies and strategies should also refer to the establishment of PES and other measures to improve ecosystem services under

existing and future integrated water resource management plans.

- The government should facilitate implementation of PES by issuing support to create contracts and registration of PES contracts and entities that manage PES.

- The governments should encourage the establishment of private schemes by acting, where possible, as facilitators and mediators between potential buyers and sellers in the establishment of private PES.

- To attract the participation of private industry such as mini hydropower generators, governments could provide effective incentives such as tax incentives (or exemptions) for financial contributions by these utilities and industries to PES schemes i.e. currency schemes.

- The type of financial arrangement should be clearly stipulated in PES contracts. In the case of direct compensation to sellers, the PES contract should stipulate; the land use, management practice or service that is paid for by the PES; and the established rates for that specified land use, management practice or service.

- The government should make sure that the contracts are specified in a manner that does not scare off potential buyers and sellers contemplating entering into PES arrangements.

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Annex 1: PES schemes in literature: A Sri Lankan Perspective

	Title	Seller	Buyer	Type of transfer: Financial or in-kind	Summary
1	Participatory forestry on degraded forest lands (1993-2000) (Kallesoe, M. and De Alwis, D.)	Forest Department	Local communities and farmers	Tree planting (timber and fruit tree species) Lease agreements Food coupons (in return for labor)	The beneficiaries of these externalities have not been clearly identified by the project and the value of the environmental services provided by the Farm Wood Lots and homestead gardens has not been assessed or targeted for reward payments.
2	Upper Watershed Management Project (1998-2005) Kallesoe, M. and De Alwis, D. (n.d.).	Project developers	Community Based Organizations (CBOs)	Technical assistance, seeds and plants Introduction of bee keeping and livestock raising as alternative livelihoods Micro credit scheme for the establishment of small timber farms	
3	Energy Services Delivery Project & Renewable Energy for Rural Economic Development Project (1997), Kallesoe, M. and De Alwis, D. (n.d.).	Project developers	Adjacent communities	Provision of electricity	Federation of Electricity Consumer Societies (FECS) which includes all the Electricity Consumer Societies (ECS), (Members of CBOs overseeing the daily operations of the micro-hydropower plants are referred to as ECS).
4	Conservation and Sustainable Use of Medicinal Plants	Government of Sri Lanka	Local population	Supporting the cultivation of medicinal plants in homestead	

	Project (1998)			gardens, establishing nurseries and training community members in their maintenance as well as investigating opportunities for selling medicinal plants commercially. Market access has been facilitated through the institutional setup established by the project	
5	Innovations and Application of Participatory Economic Planning for Conservation of Biodiversity and Water Resources in the Knuckles Range of Forests (2002)	Forest Department, IUCN	Local community	Income generating opportunities associated with tourism (tour guides and infrastructure development)	
7	Valuing ecosystem services from restoring ancient irrigation systems: An application comparing labor vs. monetary payments for choice experiments Dissanayake, S.T. and Vidanage, S.,	Local communities or the individuals who own and manage the lands where these tanks are located	Local communities, governments or organizations that would benefit from restoring the ancient	Financial Transfers – Monetary payments In-kind transfers – Labor participation Financial Transfers – Monetary payments In-kind transfers – Labor participation	Other actors – local government agencies, non-governmental organizations and local communities

	2023.		irrigation systems		
8	The Imperative of a Payment Mechanism for Ecosystem Services to Address Sri Lanka's Economic Crisis	Farmers Local Communities Landowners Private Sector	Industries Hydropower plants Tourism sector	This involves a financial transfer because the beneficiaries of the ecosystem services should pay for the maintenance and conservation. In-kind transfers – benefits from eco-friendly industries, attracting eco-tourists, securing water resources and enhancing conservation efforts	Other actors – Government, NGOs and environmental organizations, who act as intermediaries for connecting the buyer and seller The evaluation and monitoring are done by the government by providing the necessary policy framework and incentives
9	Modelling soil erosion and hydropower linkages of Rantambe reservoir, Sri Lanka: towards payments for ecosystem services. Udayakumara, E.P.N. and Gunawardena, P., 2022.	Farmers Landowners and the community/individuals who are involved in implementing the soil and water conservation (SWC)	Power Generation Facility (PGF)	Financial transfers from the PGF to the farmers who are the sellers and it also suggests financial transfers from the fertilizer importing authority as well	Other actors – Uma oya watershed community, fertilizer importing authority Here they monitor the soil erosion rates, and sedimentation levels which can influence the hydropower generation The monitoring and evaluation is done by the government agencies, NGOs etc.

		intervention			
10	Money growing on trees: A classroom game about payments for ecosystem services and tropical deforestation. Dissanayake, S.T. and Jacobson, S.A., 2021.	Landowners Farmers, Local Communities In the REDD+ progam, the sellers are the developing countries	Government NGOs Private Companies	Financial transfers from the REDD+ program to the users of the forests or the owners In-kind transfers – ecosystem services and infrastructure	Other actors - REDD+ program Monitoring and evaluation – tracking the progress an assessing the impacts of the implemented PES
11	Potentials in applying payments for ecosystem services approach of biodiversity conservation in Sri Lanka Muthuthanthirige, D.L. and Rajapakshe, P.S.K., 2017.	Farmers Residents	Urban consumers Hydropower generation companies Agricultural and private organizations	Financial transfers- City water tax Financial compensation for REDD+ Tourist fees for protected areas Payments to farmers for carbon sequestration	Other actors – Local communities, government agencies and other private companies Monitoring and evaluation – monitoring the changes in the ecosystem services and the socioeconomic impact and also evaluate the cost-effectiveness of the PES
12	Beyond carbon: conceptualizing payments for ecosystem services in blue forests on carbon and other marine and coastal ecosystem services	Landowners and communities that manage and conserve the blue forests	Government agencies interested in coastal protection, carbon sequestration and	Financial Transfers – Carbon credit Payment for blue carbon sequestration (blue carbon credits/offsets) Blue carbon payments	Other actors- marine conservation community, government bodies and other local communities Monitoring and evaluation – to assess the effectiveness of PES programs and the impact on marine and coastal ecosystems and evaluate the success of financial mechanisms and the protection of

	Lau, W.W., 2013	Protected area managers, fisheries and aquaculture operators	other ecosystem services Private industries that benefit from water quality and capital management Consumers of clean water		ecosystem services
13	Valuing ecosystem services, biodiversity and their contribution to farmer's livelihood with potential for future benefit shearing mechanism of forestgarden farming systems of three different agro-ecological zones in sri lanka. Patirana, P. and Athukorala, A.	Forest garden farmers and individuals with lands for potential for establishing new forest garden farming	Consumers of forest garden farming products Government agencies and conservation organizations	Financial transfers includes the buyers (consumers and other organizations) paying for the sellers (FGP farmers) for their ecosystem services Premium prices of the FGP-certified products In-kind transfers – training and resources for the FGP farmers Development of the irrigation systems and other infrastructure for their activities	Other actors – government agencies, NGOs, local communities. Consumers of FGP products Monitoring and evaluation – monitoring and evaluating the impacts of PES programs on both ecosystem services and livelihood
14	Sri Lanka Biodiversity ing Initiative (BIOFIN)			Sustainable Standards and Certification: Introduction of Sustainable Tourism	To encourage service providers within the tourism sector to adopt sustainable tourism norms and standards which would have a positive impact on biodiversity

d by the United Nations nt Programme (UNDP_	Eco-labels: Introduction of an Eco Label for products with certified sustainable	To encourage production and consumption of goods and services according to the norms and standards that would promote conservation and sustainable use of biodiversity
	Green Lending: "Green Financing" under the Sustainable Banking	To encourage commercial banks to prioritize bank lending to business activities with in-built mechanisms aimed at adopting sustainable environment and biodiversity norms and standards (Pilot project)
	Corporate Social Responsibility and its increased share in biodiversity conservation	To encourage the corporate sector to ensure a minimum share of the CSR allocation for conservation of biodiversity
	Lotteries: a lottery for biodiversity conservation	To mobilize financial resources to fund national projects and programmes for conservation of terrestrial and marine biodiversity
	PES: Payment for watershed management at mini-hydro power plant	To improve watershed management through a PES scheme for enhancing and sustaining hydro-power generation by a private power producer
	PES: Payment for watershed management for hydropower	To improve watershed management through a PES scheme for enhancing and sustaining hydro-power generation by the state-owned power generation sector
	Payment for negative externalities of coal power generation	To establish a mechanism to arrest negative externalities of coal power generation under the "polluter pays" principle.
	Green bonds: Issuing international sovereign green bonds	To raise funds from international capital markets by issuing sovereign bonds with a restricted purpose of investing in biodiversity
	Eco-tourism: Promoting ecotourism practices in the small-scale	To promote "nature-based" tourism services with emphasis on conservation and sustainable use of biodiversity and ecosystems.
	Conservation license plates: Green license plates for motor vehicles	To mobilize funds for investing in biodiversity and to promote social recognition of caring environment with a voluntary payment for "green" number plates

			Conservation license plates: Green bank cards	To mobilize funds for investing in biodiversity and to promote social recognition of caring environment with voluntary payment for “green” credit and debit cards
			Carbon markets: Introduction of a voluntary CO2 carbon trading mechanism in Sri Lanka	To promote carbon-neutral production and, thereby to generate funds through carbon trading
			Lobbying for public budget allocations for increased spending on biodiversity	To increase government’s annual budgetary allocation for spending on biodiversity with increased number of projects for biodiversity spending
			Revenue from environmental penalties to enhance current revenue or to minimize future costs	To make use of environmental penalties either to increase biodiversity or to reduce negative impacts on biodiversity
			Diaspora Financing and investment: mobilization of foreign private remittances	To raise international finance from private remittance flows for biodiversity
	Medium to long-term multi-stakeholder strategy and action plan for management and conservation of the Kelani River Basin, 2016-2020. Final report	Other actors – government agencies, NGOs, local communities. Consumers of FGP products Monitoring and evaluation – monitoring and evaluating the impacts of PES programs on	Kelani River Multi-Stakeholder, Partnerships (KRMP) Other government bodies and environment agencies who are interested	Financial Transfers includes funds from 65 well defined initiatives In-kind transfers – technology improvement, water quality monitoring	Other actors – technical agencies, private and public partnerships Monitoring and evaluation - periodic monitoring of the project's activities, ensuring that it aligns with national priorities and conventions.

	both ecosystem services and livelihood	in preserving the kelani river basin		
An appraisal of challenges in the sustainable management of the micro-tidal barrier-built estuaries and lagoons in Sri Lanka	The sellers are the individuals and communities who manage the lagoons and estuaries Local fish communities Landowners	Mangroves for the Future (MFF) initiative IUCN	Not stated	Other actors include the participants Of the colloquium Government agencies Community organizations Private sector Monitoring and evaluation of the proposed PES system
Multiple benefits of small irrigation tanks and their economic value : a case study in the Kala Oya Basin, Sri Lanka	Local Communities Farmers Landowners	Industries Urban water users Fisherman Tourists	None of the above, it is not specified whether it is a financial or in-kind transfer	Other actors - Mahaweli Authority of Sri Lanka Local communities Farmers Industries Tourists Monitoring and Evaluation include regular Tracking of the PES and periodic assessment
Payment On Ecosystem Service (PES) Arising from Kandyan Home Garden				