

# Payments for Ecosystem Services

Payments for ecosystem services (PES) occur when a beneficiary or user of an ecosystem service makes a direct or indirect payment to the provider of that service. The idea is that whoever preserves or maintains an ecosystem service should be paid for doing so.

**Key words:** PES; payments for conservation; water PES; wetland PES

## How does it work?

[Ecosystems \(/content/sdfinance/en/home/glossary.html\)](/content/sdfinance/en/home/glossary.html)—forests, mountains, wetlands, agricultural land, freshwater—provide a variety of services that are economically valuable: fresh water supply for human settlements (e.g. by filtering the water from contaminants); irrigation and power generation; or storm protection and pollination. [Ecosystem services \(/content/sdfinance/en/home/glossary.html\)](/content/sdfinance/en/home/glossary.html) are grouped into four main categories: 1. Provisioning services (the products obtained from ecosystems such as food and fresh water); 2. Regulating services (the benefits obtained from the regulation of ecosystem processes such as air quality and pollination); 3. Cultural services (the non-material benefits that people obtain such as spiritual enrichment, recreation and aesthetic experiences) that directly affect people; and 4. The supporting services needed to maintain the other services (such as photosynthesis and nutrient recycling). The provision of such services might require communities living in the proximity of the ecosystem to undertake or not to undertake certain activities. To complete these tasks in the absence of regulatory provision, the communities need a financial incentive. The Payments for Ecosystem Services (PES) is the mechanism that governs these payments. In other words PES (<https://www.cbd.int/financial/pes/unitedkingdom-bestpractice.pdf>) involves a series of payments to land or other natural resource owners in return for a guaranteed flow of [ecosystem services \(/content/sdfinance/en/home/glossary.html\)](/content/sdfinance/en/home/glossary.html) or certain actions likely to enhance their provision over-and-above what would otherwise be provided in the absence of payment.

PES can thus support the conservation and expansion of [ecosystems \(/content/sdfinance/en/home/glossary.html\)](/content/sdfinance/en/home/glossary.html) when the latter generate services that can be valued in economic and financial terms. For example, a beverage company can pay farmers to reduce the use of chemical pesticides instead of paying higher fees for water treatment facilities. Similarly, the Ohio River Basin Water Quality Trading Project ([http://wqt.epri.com/pdf/3002001739\\_WQT-Program-Summary\\_2014-03.pdf](http://wqt.epri.com/pdf/3002001739_WQT-Program-Summary_2014-03.pdf)) aims to reduce nutrient loading in water by connecting power plants, wastewater utilities, and over 200,000 farmers. PES can be labelled according to their geographical scale (local, regional and global), the structure of the compensation (direct and indirect / public and private), the type of ecosystem (forests, wetlands, etc.) they protect or the four types of services (see above) the payment is provided for.

In sharp contrast to the ["polluter pays principle \(/content/sdfinance/en/home/glossary.html\)"/a>, PES follows the \["beneficiary pays principle \\(/content/sdfinance/en/home/glossary.html\\)"/a>, compensating individuals or communities whose land use \\(or other decisions\\) influence the provision of \\[ecosystem services \\\(/content/sdfinance/en/home/glossary.html\\\)\\]\\(/content/sdfinance/en/home/glossary.html\\). The underlying assumption is that the individual has the right to pollute and "society" must provide compensation to avoid pollution costs and induce non-polluting resource management decisions. The \\(efficient policy\\) minimum compensation is set to counterbalance an income loss \\(e.g. not farming a certain area\\) or the costs of undertaking a certain activity. A maximum compensation \\(not recommended\\) is equal to the value of \\[ecosystem services \\\(/content/sdfinance/en/home/glossary.html\\\)\\]\\(/content/sdfinance/en/home/glossary.html\\) provided to society due to the management regime, but not captured by the land use decision maker. Participants can be individual landowners, farmers, communities, businesses or public entities. However, because most \\[ecosystem services \\\(/content/sdfinance/en/home/glossary.html\\\)\\]\\(/content/sdfinance/en/home/glossary.html\\) are not traded in markets, the intervention of a regulatory agency may be needed to create those markets. The underlying economic values can be determined indirectly by a multiplicity of models and techniques, for example shadow pricing methods such as \\[hedonic pricing \\\(/content/sdfinance/en/home/glossary.html\\\)\\]\\(/content/sdfinance/en/home/glossary.html\\) or \\[contingent valuation \\\(/content/sdfinance/en/home/glossary.html\\\)\\]\\(/content/sdfinance/en/home/glossary.html\\). \\[Valuations \\\(/content/sdfinance/en/home/glossary.html\\\)\\]\\(/content/sdfinance/en/home/glossary.html\\) are intrinsically linked to a specific geographical and social context, thus creating challenges to the determination of global standards or price ranges for \\[ecosystem services \\\(/content/sdfinance/en/home/glossary.html\\\)\\]\\(/content/sdfinance/en/home/glossary.html\\). Despite these challenges, technology and innovations \\(e.g. satellite imagery\\) have reduced the cost of \\[valuations \\\(/content/sdfinance/en/home/glossary.html\\\)\\]\\(/content/sdfinance/en/home/glossary.html\\) and increased the reliability of the pricing of \\[ecosystem services \\\(/content/sdfinance/en/home/glossary.html\\\)\\]\\(/content/sdfinance/en/home/glossary.html\\).\]\(/content/sdfinance/en/home/glossary.html\)](/content/sdfinance/en/home/glossary.html)

The narrow definition of PES as a voluntary transaction negotiated among private contractors has been surpassed by the implementation of conceptually alike but broader schemes characterized by the intermediation of the Government between those who benefit and those who preserve the ecosystems' functioning. This broader definition includes direct payments by public authorities to private land owners to maintain or enhance the forest cover, for example. The payments to the landowner may be financed either 1. **Directly** by the payments of (private) beneficiaries, for example by Nestle (formerly Vittel) to stop farmers using chemicals in north-eastern France or by the City of New York to protect watersheds in the Catskill mountains; or 2. **Indirectly** by the intermediation of the public authority which—on behalf of the wider public—disburses the compensation for conservation such as in the China's Conversion of Cropland to Forest and Grassland Programme or in the Costa Rica's Environmental Services Payment Programme. To fund these expenditures, countries can either access the general budget or introduce PES-like taxation with special-purpose taxes and fees, targeting the tourism, water, electricity, transport and extractives sectors (i.e. the implied beneficiaries). Costa Rica financed its programme with the resources generated from gasoline taxes. In Vietnam prices are regulated for hydropower generators (20 VND/KWH), clean water suppliers (20 VND/m<sup>3</sup>), tourist service providers (1-2 per cent of revenues) for a total value of contracts that surpassed US\$150 million in 2016.

Payments are ideally subject to the evidence of the provision of the [ecosystem service \(/content/sdfinance/en/home/glossary.html\)](/content/sdfinance/en/home/glossary.html) (output-based payments) and should address [additionality \(/content/sdfinance/en/home/glossary.html\)](/content/sdfinance/en/home/glossary.html) concerns to reduce the cost of policy implementation. However, the output or results-based payment might be difficult to assess or require a long time-lag for monitoring and verification (e.g. changes in quality of water or reduced risk of flooding). The alternative is to disburse payments based on the modification of a certain practice, for example phasing out chemical fertilizers or undertaking of certain actions, for example planting trees (input-based payments). These are activities that can be directly monitored and linked to a specific action of an individual and therefore trigger a payment.

The preparatory process of establishing a PES can be described in the subsequent steps ([http://www.cifor.org/publications/pdf\\_files/Books/BFripp1401.pdf](http://www.cifor.org/publications/pdf_files/Books/BFripp1401.pdf)) which are followed by the negotiation of the agreements, the actual legal structuring, the financing and the implementation. These are:

1. Identification of the [ecosystem services \(/content/sdfinance/en/home/glossary.html\)](/content/sdfinance/en/home/glossary.html) and geographical boundaries;
2. Identification of the sellers/providers and buyers/beneficiaries;
3. Definition of the market and of the price;
4. Determination of the governance, institutional and legal arrangements;
5. Collection of the biophysical data baseline data for the monitoring system.

The functioning of the PES requires the monitoring of the interventions and the disbursement of payments. The efficiency and effectiveness depends on the willingness and capacity of the private actors to pay and on the quality of coordination/collaboration. In absence of the above, the determinant variable is the capacity of the Government to mediate among the buyers and sellers. This capacity to pay is obviously weaker in the poorest and most fragile countries where [Official Development Assistance \(ODA\) \(/content/sdfinance/en/home/glossary.html\)](/content/sdfinance/en/home/glossary.html) has been traditionally used to complement or substitute for the lack of resources.

### Stakeholders

1. The buyer/beneficiary of an [ecosystem service \(/content/sdfinance/en/home/glossary.html\)](/content/sdfinance/en/home/glossary.html): the entity, either an individual/company or the Government that directly benefits from the existence of an [ecosystem \(/content/sdfinance/en/home/glossary.html\)](/content/sdfinance/en/home/glossary.html) and is willing/capable to pay for its preservation.
2. The seller/provider of an [ecosystem service \(/content/sdfinance/en/home/glossary.html\)](/content/sdfinance/en/home/glossary.html): Any individual or community whose land use or other decision can influence the provision of [ecosystem services \(/content/sdfinance/en/home/glossary.html\)](/content/sdfinance/en/home/glossary.html). She/he will obtain a payment to undertake or not to undertake (e.g. not exercising certain economic rights) certain activities to preserve the provision of [ecosystem services \(/content/sdfinance/en/home/glossary.html\)](/content/sdfinance/en/home/glossary.html). The payment can thus compensate for a lost income (reduced gains from agriculture) or human labour and capital investment (e.g. planting trees).

3. Public authority: the public authority (often a local entity) might disburse payments and collect mandatory fees and taxes. PES often require the issuance of a law or Government decree/regulation if intermediated or paid by public resources. If PES are negotiated among private parties, the Government usually act as a broker or facilitator.

Affected community: Everyone who benefits from the provision of an [ecosystem service](#) ([/content/sdfinance/en/home/glossary.html](#)). This refers to the larger population who might benefit from [ecosystem services](#) ([/content/sdfinance/en/home/glossary.html](#)) but, for a number of reasons, is not formally participating in the PES as a beneficiary or provider of services.

#### *Potential in monetary terms*

The monetary value of PES vary widely based on the size/properties of the ecosystem and on the willingness and capacity of beneficiaries to pay for the [ecosystem services](#) ([/content/sdfinance/en/home/glossary.html](#)). The World Resource Institute has estimated the value of [ecosystem services](#) ([/content/sdfinance/en/home/glossary.html](#)) to be US\$33 trillion a year, but these values remain largely on paper. The largest PES are found in water and carbon sequestration (carbon markets are profiled as a separate solution ([http://www.undp.org/content/sdfinance/en/home/solutions/carbon-markets.html](#))). In its broadest definition also ecological fiscal transfers ([http://www.undp.org/content/sdfinance/en/home/solutions/ecological-fiscal-transfer.html](#)), payments for agricultural conservation easement, and biodiversity offsets ([http://www.undp.org/content/sdfinance/en/home/solutions/biodiversity-offset.html](#)) can be broadly profiled as PES. The focus of this review is on water PES and other payments for biodiversity conservation (e.g. pollination).

An investment ([http://www.forest-trends.org/documents/files/SOWI2014.pdf](#)) of US\$12.3 billion flowed to nature-based solutions for the management of water and watersheds, rehabilitating and protecting more than 365 million ha of ecosystems. At least US\$7.3 billion (60 per cent) of this value was used to compensate landowners for their conservation actions directly. The market is still dominated by public subsidy programmes that account for about 90 per cent of the funding. PES transactions are mostly mediated by the public sector and [ODA](#) ([/content/sdfinance/en/home/glossary.html](#)) in developing countries. Among private sector buyers the highest amount was recovered from water utilities and food and beverage companies, followed by the energy sector. While a number of large PES projects have started in Latin America and Africa, mandatory provisions in China and Vietnam generated most of the flows in developing countries. Private payments for water were mostly collected in Europe, the USA and South Africa. Mixed instruments such as collective action funds that can pool multiple resources have sprouted in Latin America, where water trust funds attracted more than US\$65 million in long-term watershed project finance.

Statistics for non-water PES are scattered, with the possibility of profiling only indicative examples. For example, Syngenta has developed the Operation Pollinator ([http://www.fao.org/fileadmin/user\\_upload/pes-project/docs/FAO\\_RPE-PES\\_Syngenta-Europe.pdf](#)) in collaboration with academia, NGOs and government to assist farmers for enhancing farm biodiversity.

## **When is it feasible?**

#### *Legal and/or other feasibility requirements*

For PES to work, a buyer must be identified, the market conditions understood and the service provider legally recognized. The cost for the provision of the service by the provider needs to be priced. A robust baseline and supporting information are basic requirements for [economic valuation](#) ([/content/sdfinance/en/home/glossary.html](#)) of [ecosystem services](#) ([/content/sdfinance/en/home/glossary.html](#)).

Direct financing schemes are feasible when both beneficiaries and sellers are local and market transaction costs can be kept low. Where [ecosystem service](#) ([/content/sdfinance/en/home/glossary.html](#)) benefits cross boundaries, the transaction costs associated with identifying and matching buyers and sellers are higher and the incentives to free-ride require stronger government intermediation. Ultimately the willingness and/or ability to pay by the beneficiary is the necessary condition for establishing a PES.

The feasibility assessment for a PES should look at (or produce when missing): 1. the [economic valuation](#) ([/content/sdfinance/en/home/glossary.html](#)) of [ecosystem services](#) ([/content/sdfinance/en/home/glossary.html](#)); 2. the legal and institutional framework for PES transaction; 3. the level of organization of stakeholders; and 4. the capacity to pay of beneficiaries and providers.

To be feasible, it is important that the financing structure of any PES is both sustainable and sufficient. It must provide a "win-win" opportunity for both the supplier and the buyer(s) of the service. The buyer covers the cost of provision, which must be (1) lower than any alternative method by which the buyer might secure the same service, and (2) sufficient to ensure that the alternatives are less economically attractive.

#### *Minimum investment required and running costs*

The short-term design and negotiation costs are difficult to qualify but include research, [valuation](#) ([/content/sdfinance/en/home/glossary.html](#)) studies, awareness raising, and consultations and, when necessary, legal advice for reforming the law.

The running costs of the PES scheme include financial transaction costs, measuring, reporting and verification (MRV) and regulatory oversight. These might also include communication, negotiation, enforcement costs, and provisions for legal risks. There is evidence that transaction costs are often higher than anticipated in the design.

#### *In what context/when it is more appropriate*

PES are most likely to appear in situations where clearly identifiable actions that can increase the supply of a service are identified and/or when there is a clear demand for the service(s) in question, whose provision is commercially viable. On the contrary PES should not be established when no beneficiary of the [ecosystem services](#) ([/content/sdfinance/en/home/glossary.html](#)) can be clearly identified or where the actions to be compensated cannot clearly be connected with their impact on the flow of [ecosystem services](#) ([/content/sdfinance/en/home/glossary.html](#)).

## **What are the main risks and challenges?**

#### *Pros*

- Flexible instrument compared to command-and-control regulation, allowing high customization to local circumstances.
- Behavioural changes are promoted with positive incentives rather than coercion, more likely leading to transformational change.
- PES can help to correct market failures by pricing conservation efforts.
- PES provide opportunities for cash income in rural areas where poverty might be concentrated.
- 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.

#### *Cons*

- The [economic valuation](#) ([/content/sdfinance/en/home/glossary.html](#)) of [ecosystem services](#) ([/content/sdfinance/en/home/glossary.html](#)) is a difficult and still costly process, despite innovations in techniques and technology.
- PES implementation might be costly due to the specifics of design, negotiation and implementation of the programme.
- PES are not designed to reduce poverty but primarily to offer economic incentives to foster the conservation of [ecosystem services](#) ([/content/sdfinance/en/home/glossary.html](#)). Additional measures need to be enforced to make PES pro-poor.
- The efficacy of PES implementation is partially connected to the availability of data on land property, which is a known challenge in many developing countries.
- PES might result in limiting the flexibility of local government and communities in making decisions on their own development particularly where easements or long-term contracts specify a narrow range of alternatives.

#### *Risks*

- Failure to monitor the effectiveness of the compensation schemes, including risks of not fulfilling the performance condition.
- Risks associated with the enforcement of property rights. For example, illegal logging or land appropriation will undermine the ability of a landholder to provide the [ecosystem service](#) ([/content/sdfinance/en/home/glossary.html](#)). Changes in land management rules and regulations may also have a significant impact on [ecosystem service](#) ([/content/sdfinance/en/home/glossary.html](#)) delivery and the PES.
- Leakage can occur when the provision of [ecosystem services](#) ([/content/sdfinance/en/home/glossary.html](#)) in one location increases pressure for conversion in another.
- Unintended perverse incentives that negatively affect biodiversity, for example, farmers are paid to plant non-native tree species.
- Regressive distributional outcomes, especially, when limiting access to resources and land to impoverished communities. Elites might capture the largest income provided through PES.

- Corruption and abuses. Like other public subsidies, PES schemes are vulnerable to corruption practices that might divert resources.
- Uncontrolled liabilities. The Government might incur in commitments for conservation payments beyond its budget due to flawed legal arrangements or lack of coordination, putting the whole financial sustainability of the programme at risk.

## How can the design be ameliorated to improve the impact?

The impact of PES can be very high by generating measurable conservation outcomes, e.g. carbon sequestration, reforestation, water control. It is intrinsically dependent on the ecosystem flows that are enhanced and or preserved. One of the largest and long-standing PES is in Costa Rica (<http://pubs.iied.org/pdfs/16514IIED.pdf>) where since 1997 nearly one million hectares of forest were preserved through PES programmes, helping to increase the country's forest cover to 50 per cent from a low of just 20 per cent. Between 2000 and 2007 the National Programme for Hydrological Environmental Services in Mexico (<http://pubs.iied.org/pdfs/16525IIED.pdf>) has reduced the rate of deforestation from 1.6 per cent to 0.6 per cent. In China over a six- year period, the Sloping Lands Conversion Programme and Cropland to Forest Programme planted about 37 million hectares. Over 50 million low-income Chinese households might have participated in PES schemes from the early pilots in the 1980s. The long-term watershed conservation program of New York City provides a source of high-quality drinking water to over nine million consumers. The program also generated sizable savings for the city administration - it was funded at the cost of US\$1.5 billion compared to US\$8–10 billion estimated for the construction of a water treatment plants, thus freeing resources for investments in other social and environmental programmes.

Poor people inhabit many of the lands that generate key [ecosystem services](/content/sdfinance/en/home/glossary.html) in developing countries, suggesting the opportunity of using PES to achieve multiple development-conservation outcomes. The opportunity is even higher for small landowners and/or communities in the low-income countries located in the tropics where biodiversity hotspots are concentrated. While PES are not primarily designed to reduce poverty, they can be oriented towards the achievement of social objectives, including poverty reduction. The Socio-Bosque (<http://sociobosque.ambiente.gob.ec/>) and Bolsa-Verde (<http://www.mma.gov.br/desenvolvimento-rural/bolsa-verde>) programmes in Ecuador and Brazil, respectively, are good examples of socially-oriented PES. Bolsa-Verde, for example, provides annually R\$1,200 (ca. US\$370) to families in extreme poverty that live in priority areas for conservation. Evidence of the impact of PES on poverty reduction is emerging. In Rwanda (<https://www.cbd.int/financial/pes/Rwanda-PES-poverty.pdf>) it was found that the extra income provided by the compensation scheme can act as an economic multiplier; it did not only advance the material standards of living of beneficiaries, but allowed new investment to increase land productivity. Similarly, PES-related land use changes can positively influence local communities' earnings indirectly through the creation of alternative businesses like eco-tourism, organic farming and sustainable harvesting. Land changes due to the implementation of Conversion of Cropland to Forest and Grassland Program in China were found (<http://www.tandfonline.com/doi/pdf/10.1080/09640560600747554>) to provide farm households with increased net profits. Therefore, in the short-term PES can provide increased cash income and facilitate exposure to alternative business activities or sustainable resource use practices (e.g. in Bolivia farmers participating in PES receive beehives and apicultural training). In the longer term PES, can positively affect poverty reduction through improved resilience of communities and increased land productivity.

While PES can certainly contribute to poverty reduction, the resources allocated are unlikely to be sufficient to solve long-standing deprivation problems or the structural lack of economic and employment opportunities. Moreover, in certain instances, environmental compensation schemes can reinforce rather than reduce inequalities. This is more evident in regions where land ownership is concentrated and impoverished communities are excluded from accessing natural resources. A resource plan to account for sellers' and communities' access to forest resources remains essential for ensuring that there is no loss of economic rights by vulnerable groups.

More effective implementation arrangements can also reduce transaction costs and free resources for development. Lessons learned point to the preference of use of simple indicators for assessing the environmental impact of conservation activities and an accurate targeting of vulnerable social groups' participation. For example, targeting areas with low social development might not help reaching the poor if the land owner/beneficiary is not from this constituency, thus requiring different targeting schemes.

## Guidelines and Case Studies

### Detailed guidance

- Payments for Ecosystem Services (PES): A practical guide to assessing the feasibility of PES projects (<http://www.cifor.org/library/5260/payments-for-ecosystem-services-pes-a-practical-guide-to-assessing-the-feasibility-of-pes-projects/>)
- Payments for Ecosystem Services: Getting Started ([http://www.unep.org/pdf/PaymentsForEcosystemServices\\_en.pdf](http://www.unep.org/pdf/PaymentsForEcosystemServices_en.pdf))
- Institutionalizing Payments for Ecosystem Services ([http://www.thegef.org/sites/default/files/publications/28252nomarks\\_0.pdf](http://www.thegef.org/sites/default/files/publications/28252nomarks_0.pdf))
- Payment for ecosystem services: A best practice guide ([https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/200920/pb13932-pes-bestpractice-20130522.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/200920/pb13932-pes-bestpractice-20130522.pdf))

### Case studies

- Lessons learned from 20 years of PES, Costa Rica (<http://pubs.iied.org/pdfs/16514IIED.pdf>)
- New York City watershed, USA (<http://www.nycwatershed.org/>)
- Vittel (Nestlé Waters), France (<http://pubs.iied.org/pdfs/G00388.pdf>)
- Bolsa Floresta, Brazil (<http://mapas.fas-amazonas.org/>)
- Socio Bosque, Ecuador (<http://sociobosque.ambiente.gob.ec/>)

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Our Perspective

