From principles to practice in paying for nature's services

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Abstract

Payments for Environmental Services (PES) constitute an innovative economic intervention to counteract the global loss of biodiversity and ecosystem functions. In theory, some appealing features should enable PES to perform well in achieving conservation and welfare goals. In practice, outcomes depend on the interplay between context, design, and implementation. Inspecting a new global dataset, we find that some PES design principles pre-identified in the social science literature as desirable, such as spatial targeting and payment differentiation, are only partially being applied in practice. More importantly, the PES-defining principle of conditionality – monitoring compliance and sanctioning detected non-compliance – is seldom being implemented. Administrative ease, multiple non-environmental side objectives, and social equity concerns may jointly help explain the reluctance to adopt more sophisticated, theoretically informed practices. However, by taking simplifying shortcuts in design and implementation, PES programmes may become less environmentally effective and efficient as economic incentives, thus underperforming their conservation potential.

The rationale for payments

Continued environmental degradation calls globally for innovative policies to bridge real trade-offs between environmental and development goals (1). PES arose from the hope to deal more consciously with such trade-offs in nature conservation and environmental governance, directly incentivizing landowners and other resource stewards to adopt environmentally friendly practices. Theoretically, PES feature a *quid pro quo* paradigm of conditionality: you only pay for what you get (2,3). They aim to enhance the additionality of environmental services (ES) provided, i.e. better environmental outcomes compared to a business-as-usual baseline. In practice, additionality will depend on the interplay between context, design, and implementation. However, often environmental effectiveness is not the only policy objective of PES; frequently (implicit or explicit) other goals, especially related to human welfare and social equity, are at play (4-6).

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PES implementation has expanded quickly in the last two decades, and impact evaluation studies are emerging with first lessons (7-9). The potential for PES to be direct and performance-based, yet flexible, negotiated and fair is promising (2,4,10), although trade-offs with poverty and equity goals (11-12), and among different environmental goals (13), have raised concerns. A poor biophysical science base might also render PES ineffective (14). Sometimes short-run payments can effectively induce change, e.g. subsidizing the adoption of sustainable technologies (15), yet often payments and financing structures have to be of a lasting nature to ensure that environmentally desirable practices continue over the long term (16).

A salient question pertains to the role of the social-science foundations of PES. In particular, to what extent do practitioners incorporate state-of-the-art thinking into PES design and implementation for effective and efficient, yet equitable outcomes? Without denying biophysical preconditions for PES (14), we argue that the social sciences play a vital role in this pre-assessment. As economists debating PES functionality, we will in the following discuss (i) preconditions for PES implementation and (ii) informed economic principles of PES design, followed by (iii) an empirical stocktaking of the degree to which these principles are *de facto* being implemented, including (iv) when looking at different targeted ES. In explaining our findings, we analyse the role of (v) transaction costs, and vi) equity considerations related to different design and (implementation practices. We conclude by discussing the implications for environmental policies and strategies (vii).

Preconditions for PES

While PES programmes are conceived to bridge conflicts between ES users and providers over management of natural resources, perceiving PES as a silver bullet could easily misguide conservation investments (10-12). Decision makers should always evaluate the pertinence of PES *vis-à-vis* other available policy instruments. In our view, four preconditions should be checked (10, 17-18):

(i) *ES users' willingness to pay likely exceeds ES providers' willingness to accept compensations*. This is a fundamental economic reality check for PES: does the user-perceived value of the ES exceed the value of landholders' expected costs of ES delivery? Usually we know neither the precise value of the ES nor the precise cost of participation, but we can make informed guesses.

(ii) *ES users are capable of internally organizing payments*. In other words, the ES user (or public) institutions are in place to champion the introduction and administration of PES.

(iii) *ES providers have sufficiently secure user rights over environmentally critical resources to effectively exclude third-party intrusions*. More specifically, landowners and resource stewards need to actually be in charge of the decision-making processes that will come to determine ES provision.

(iv) *Any pre-existing intrinsic motivations for good stewardship are not crowded out by extrinsic PES incentives*. In other words, payment on balance needs to motivate receiving providers to sustainably deliver more ES.

We should probably see the first precondition (i) as an economic *sine qua non* for PES (17,18): if ES supply costs exceed ES demand values, the very foundation for voluntary agreements will be missing. If the answer to any of the other questions (ii)-(iv) is negative, PES implementation might still be possible, if it is enabled by supplementary actions, e.g. land tenure reform, contract negotiation, institutional capacity building, or incentives customized to motivations. But these actions typically take time and resources. Furthermore, this will also affect subsequent PES design choices (9), which we will now turn to.

Desirable design features

Informed design principles of conservation policy instruments emerge when theory and gradually emerging evidence are reiteratively being confronted. Yet, the conservation evidence base, other than for protected areas (the oldest policy tool), arguably lags behind in terms of scientifically rigorous impact evaluation, compared to e.g. development, health, or education interventions (19). For PES, this is no different

(7, 20-21). Encouragingly though, the number of scientifically rigorous impact evaluation cases is expanding (8). Likewise, some design lessons can be drawn from comparing PES case studies (4), from cross-sectional meta-studies (5, 22-24), and from similar incentive-based mechanisms (25). Arguably, sufficient knowledge about key economic design and implementation principles for PES has thus by now been gathered for laying out some key best-practice implementation guidelines, not only from a natural (14), but also from a social sciences perspective. One recent PES design synthesis (9) calls for contextually customized PES, related for example to contract duration and scale, number and type of intermediaries, and payment modes. But the empirical evidence also points to three specific stylized design and implementation recommendations (4-5, 9, 22-25): (i) spatial targeting, (ii) payment differentiation, and (iii) enforced conditionality.

First, ES densities (e.g. forest carbon stocks) and their leverage of change (e.g. deforestation threats) tend to distribute unevenly in space (26-28): some places matter far more than others for conservation. Budgets are usually too scarce to enrol all potential ES suppliers in a scheme. Thus, it pays off to spatially target high-ES density (27) and high-threat areas for PES enrolment (28). Combined they likely provide additional environmental benefits, compared to e.g. a random selection of participants (27). In PES programmes where budget-wise only a small portion of applicant landholders can be enrolled, it may also be advisable to pre-target low-cost providers, especially where costs of ES provision likely differ much (9, 18). Furthermore, threshold and other ecological interaction effects may imply that spatial targeting needs also to enrol a minimum area size. For example, this can be achieved through spatial contiguity targets and agglomeration bonuses for collective provider enrolment (17, 25). Finally, as exemplified by the history of the Mexican national hydrological PES programme (PSAH) where up to a couple of dozens of spatial selection criteria were at some point being used, an adaptive PES design can help securing an adequate balance between different targeting goals that are overlapping in space (28-30).

Second, even among spatially carefully targeted ES suppliers, socio-economic heterogeneities may still exist. Selected ES suppliers may differ not only in potential ES density, but also in their costs of provision. If participant characteristics can be used to infer these costs, it usually makes sense to differentiate payments from the cost side. For instance, landowners on high-value lands (e.g., with more fertile soils, or closer to agricultural markets) will likely forgo higher revenues for land set-asides, and may thus require and request higher compensations to cover their opportunity costs. Unless ES providers are generally homogenous, PES implementers should vary payment offers according to proxies of provision costs and/or likely site-specific environmental benefits (9).

Finally, once participants have been selected and payment levels been set, conditionality is by design core to PES (31). We define conditionality as the combination of compliance monitoring (efforts to detect non-complying participants, typically combining remote-sensing technologies with on-site ground-truthing) and sanctions (penalties enforced on participants in response to revealed non-compliance). Yet, unless contract compliance is both credibly monitored and enforced, contracted landowners may receive payments while continuing business as usual, i.e. profitably defecting on their contractual obligations (32). Monitored and enforced conditionality is necessary to make PES function as effective incentives for conservation (24).

Design and implementation in practice

To what extent are these key design principles then being adopted and implemented in reality? We created a new global dataset (cf. Methods section) where for all included cases, first, conditional payments should *de facto* have been implemented at least once (functional criterion). Secondly, included cases should have been described at least once in the peer-reviewed literature, in ways that shed light on the design and implementation variables of our interest (analytical criterion). The resulting worldwide 70 PES programmes in our dataset constitute a sample of consolidated and well-described schemes that lend confidence in sufficient PES management experience and good quality data for their evaluation.

We then coded design and implementation features from the case descriptions, and combined these where relevant with own field-based case-specific observations. This allowed us to assess the real-world adoption of key best-practice features of PES for our sample.

First, as for spatial targeting, half of our cases (35) selected ES providers within predefined intervention areas according to proxies for ES density (Fig.1). Some (e.g. the US Conservation Reserve Programme or Mexico's PSAH) used multidimensional ES targeting; for many others priorization is much simpler (e.g. one-tier targeting of primary over secondary forests). Predicted threat/leverage assessment was in turn used much less for spatial targeting (6 cases; 9%). Almost one third of cases (19, or 31%) used neither ES densities nor threats for pre-selection (i.e. no targeting), while only 10 (14%) used both targeting criteria simultaneously.

Secondly, diversified payments were used in over half of our cases (41; 59%), though notably payments were more often differentiated by ES benefits than based on cost differences. Diversified payments are also generally more often applied in OECD countries (Fig.1), perhaps due to greater ease there with market-like payment features (cf. Equity aspects section). Again, in extreme cases payments were fully customized to each ES provider's productive condition (e.g. French Vittel watershed PES); in many others, just two PES rates apply, with a single premium being paid for particularly strategic areas (e.g. cloud forests or erosion-prone slopes).

Finally, regarding conditionality, the good news is that all initiatives monitored compliance: two thirds of them (63%) did so comprehensively; the rest to some extent. The bad news is that only one fourth of the initiatives (18; 26%) had a consistent record of sanctioning non-compliance when detected, by reducing or discontinuing payments (Fig.1). The same share (26%) enforced rules partially, while almost half of the cases (48%) have allegedly never sanctioned any participant. In principle, this could be because every contracted participant always complied. Yet, experiences in both OECD (24, 33) and non-OECD countries (4, 24, 32, 34) show that over time the rules in PES will typically be tested by tentative defiance, as an economically rational strategy. More likely than continuously perfect compliance is thus that PES implementers frequently tolerate some degree of non-compliance (24, 32).

Looking at different services

One might expect PES practices to differ according to which ES types the intervention is focused on. In Fig.2, we take a closer look. Initially, we observe some regions with high concentration of especially watershed PES: Mesoamerica, Northern Andes (cf. zoom-in maps), and Southeast Asia. In Africa, biodiversity and carbon schemes, typically financed from abroad, are more common, while OECD countries often operate PES schemes with multiple ES being targeted.

Turning to implementation practices, watershed and biodiversity focused PES tend to much more often be spatially targeted (cf. circles in Fig.2) than schemes featuring carbon or multiple ES, where spatial targeting tends to be lacking (cf. square symbols). As explained above, this could be due to either targeting to threats or to ES density. ES focus and threat targeting is insignificantly correlated (Fisher's Exact Test 5.29; α=0.12); ES focus and ES density are in turn highly significantly correlated (Fisher's Exact Test 21.94; α=0.001). This means that managers of watershed and biodiversity PES schemes are doing a particularly good job in the spatially targeting of high ES density areas. Given the spatial specificity of these two ES, this practice makes good sense.

For implemented conditionality, another key PES practice, we do not find any clear patterns of correlation with ES focus, nor with any other of our database variables (funding, region, size, etc.). Larger circles/ squares in Fig.2 show documented cases of well-enforced conditionality, but their occurrence correlates to neither ES focus, spatial targeting practices, payment differentiation, nor region. Disaggregating conditionality into monitoring and sanctioning non-compliance also yields no further insights: both are insignificantly related to ES focus and to other key background variables.

In summary, of our three pre-identified key strategic PES features to get economic incentives right, we find implementers do reasonably well in targeting ecologically strategic areas (though rarely spatially predicting threats) and diversifying payments (though using as criteria much more the supplied ES densities than the costs of ES provision). Yet, two observed design features are noteworthy.

First, the fact that less than one out of five PES schemes targets threats/ leverage is somewhat worrying: the landowners that would have complied anyhow with the PES requirements (i.e. zero threat/ leverage) have also zero costs of ES provision, so they will tend to apply first for entry into the PES programme, yet provide no environmental additionality. This phenomenon, known as adverse self-selection of participants, is thus not being addressed proactively by PES implementers (21, 35).

Secondly, only very few PES programmes actively use cost parameters, to either pre-target low-cost ES providers, or to differentiate payments according to alleged cost levels. This lack of attention to costs bodes not well for the prospects of achieving cost-effective outcomes from PES (9, 21, 25).

Notably, however, our clearly most important finding relates to PES practices, rather than programme design. While most PES programs in our data set monitor contract compliance reliably, only half of them have ever sanctioned non-compliance, and only one fourth does so consistently. This crucial aspect of environmental governance has so far received little attention in the PES debate.

Applying all of our three essential design and implementation features in combination is much less common still: only two of our 70 cases (Mexico's PSAH and Monarch Butterfly Reserve programmes, respectively) used all three sophisticated features simultaneously.

Our findings thus point to two simple, yet so far widely overlooked observations. First, PES design could generally be improved especially with respect to threat targeting and cost-efficiency, dealing better with spatial heterogeneities. Secondly, the defining implementation feature of conditional compliance is being monitored, but predominantly weakly, if at all, enforced by PES implementers. More often than not, it seems that PES implementers pay no matter what they get.

Transaction costs

The reality of PES design and implementation currently does thus not fully incorporate the lessons from both PES theory and stylized experiences. Why are practices seemingly lagging behind the principles established in the literature? One initial reason might be that sophisticated design (such as payment differentiation and spatial targeting) and demanding implementation (such as compliance monitoring and sanctioning) are too costly to effectuate: any efficiency gains from higher returns for every extra cent spent on payments could thus, so goes the argument, be outweighed by efficiency losses stemming from incremental transaction costs (36).

At the current stage of knowledge, we have neither conclusive evidence nor strong indications that high incremental transaction costs would be key in explaining why advanced design techniques are being under-adopted. For instance, in Costa Rica's national PES programme basic spatial targeting would reportedly only increase administrative costs by 3.8%, and total costs by 0.3%, while boosting ES benefits by at least 14% (27). For the UK, potential biodiversity benefits from improved spatial targeting and payment differentiation were found to be so high that even an increase in implementation costs by 70% would still be worthwhile: efficiency gains clearly outweigh added transaction costs (37). Even when detailed spatial ES data do not pre-exist, cheaply accessible proxies might be generated to guide the targeting process (26).

On the cost side, heterogeneous ES provision costs may be hard for PES implementers to handle, due to asymmetric information about them (18). Procurement auctions among potential ES providers may be highly effective in revealing provider costs, but are also potentially complex and expensive to organize (38). Still, small-scale auctions could be used first as a research tool, to then guide the subsequent selection of proxies for price differentiation at larger scales of implementation. In our PES sample, only ten cases used auctions as a participant selection and cost-informing tool. In turn, 31 cases differentiated payments by using simple proxies, with probably lower transaction costs, but also less precise estimations of the costs of ES provision.

Finally, monitoring and enforcement tend to be costly when requiring extensive field presence, and/ or acquisition of high-resolution remote-sensing data. Type of threats also matter: deforestation, for instance, is easier and typically cheaper to monitor than forest degradation from timber extraction. Similar to enforcement measures in command-and-control policies (39), PES implementers need to set the size of sanctions and levels of costly monitoring and enforcement in ways that accommodate their customized mixes of objectives (40). While we believe monitoring in particular can be costly, and thus be subjected to budget constraints, the real bottleneck for enforced conditionality was sanctioning, which *per se* is less costly. It thus seems unlikely that transaction costs would be crucial in explaining why conditionality in PES is so ill-enforced.

Equity aspects

Transaction costs aside, a second potential motive for the reluctance to adopt improved design features deserves our attention: social equity and other human welfare-related goals of PES, such as poverty alleviation. The question whether or not to differentiate payments, and if so by what criterion, may illustrate the link between PES design and two different dimensions of equity: procedural and distributional equity (11).

First, procedural equity is achieved by adequately active participation of ES providers in negotiating payments. Auctions, for instance, score particularly high in terms of integrating landowner information and perspectives into payment-setting procedures, if participants receive adequately contextualized information. They are thus procedurally more equitable than top-down determined payment schemes (41, 42).

Second, distributional equity refers to how payments are allocated across ES providers (43). PES implementers may often be inspired by the principle of horizontal equity, i.e. that (assumedly) equal landowners should be treated alike (44). Uniform payments (flat rates per hectare, household, or community) would thus be perceived to be more equitable than differentiated payments. Nevertheless, from the opposite perspective of vertical equity – that unequal landowners need customized treatment (44) — payments should be aligned with differential ES provision cost among participants. Considering equity in the final payoffs to providers (i.e. payments minus cost of ES provision), high-cost providers should thus be paid more than low-cost providers.

Yet, if poverty alleviation is a declared PES side objective, participants with lower incomes/ wealth should be pre-targeted as recipients and/ or receive higher unit payments, following a (maxi-min) principle of vertical equity (43). But favouring pro-poor redistribution may often not coincide with the above described cost-sharing criterion: poor ES providers often inhabit remotely located areas with lower average costs of ES provision. If the poorest are also low-cost ES providers, then cost-differentiated payments would have less of a redistributive effect than uniform payments.

On aggregate, navigating efficiency and equity trade-offs in the face of contextual fairness principles can lead to some hard choices for PES design (42-43). But multiple fairness principles underlying variable perceptions of vertical equity may also conduct us towards contradictory conclusions about which types of PES design are to be ranked as being more equitable. Given such complexity, and the political need for negotiation among different actors, especially public-sector PES implementers will often opt for the simpler solution of uniform payments (4). Horizontal equity perceptions ('all ES providers should receive the same payment') can conveniently justify this choice of administrative simplicity, even when ES provision cost in fact differ greatly.

Discussion

PES programmes differ in their priorities and goals, which necessarily will trigger some differences in design and implementation: it is not our purpose here to make normative prescriptions. However, we allege from our state-of-the-art assessment that PES implementers often may come to take the wrong practical shortcuts, and oversimplify the functionality of the innovative instrument they had set out to test (9). Deficiencies in the way PES are designed and implemented, so we argue, may thus help explain why PES performance in nascent impact evaluation studies arguably lags behind high expectations (7-8, 20-21).

Why, then, does enforcement in particular come out in our analysis as the key bottleneck for adequate PES implementation? Less than a matter of problems with complex biophysical monitoring (14) or prohibitive transaction costs (36), we believe enforcement is often a politically sensitive question. In conservation, the observed frequency to sanction, and the size of the penalties, may vary with factors such as agents' level of information, incidence of corruption, and the monetary and social costs of applying sanctions (45). PES implementers may fear the potential political costs associated with effective sanctioning systems, such as the administrative complexity of sanctions, possible inequity allegations if non-compliant ES providers are also poor, and erosion of incrementally-built trust (46).

Notably, most PES, especially the (area-wise often larger) public schemes, fulfil multiple side-objectives (4). Tolerating non-compliance may often dovetail well with recipient welfare, developmental, and electoral motives for transferring PES rents to favoured beneficiaries: what is denominated as side-objectives may *de facto* come to overshadow the allegedly prime environmental goals of PES, and may have been the dominant motive in the political economy scenario that initially had led to PES adoption (47).

Globally, we foresee mounting future demands to use scarce conservation finance more efficiently. If new environmental impact assessments continue to reveal inefficiencies in PES design and implementation, political pressures may eventually mount for more transparent and economically informed policy choices. This may hopefully also set the stage for better realizing the potential of PES to achieve efficient and equitable conservation impacts.

Methods

We started from the assumption that a broadened empirical base was needed to shed further light on the PES design and implementation questions at hand. We thus created a merged global dataset, by combining three pre-existing datasets of PES cases that had been compiled through independent efforts in the years 2011, 2015, and 2016, respectively. More specifically, we complemented one previous systematic PES literature review (24) with suitable cases from two additional co-author contributed databases: one global-comparative watershed PES study (5), a category arguably somewhat underrepresented in (24), and one meta-study on biophysical PES aspects (14) that is stronger than (24) in representing biodiversity-related cases.

For inclusion in our dataset, we maintained from (24) a narrow definition of PES as: "voluntary transactions between service users and service providers that are conditional on agreed rules of natural resource management for generating offsite services" (3). This ensured that all included initiatives were truly comparable in function, i.e. the manner in which land and resource uses are being influenced by the intervention is similar. This functional compatibility should be warranted even though the programmes at hand featured the provision of different (baskets of) ES.

Beyond function, however, we also set minimum data requirements for cases to be included: basic descriptors for assessing PES design and implementation were needed, such as regarding criteria for PES participation (spatial and other targeting rules), payment modalities and amounts, as well as compliance monitoring and the sanctioning of non-compliance. The number of well-researched and documented case studies was smaller than we had initially hoped for. We added 12 cases drawing on the unpublished primary data from (5). For those cases, we had to search for additional literature to complete our set of minimum descriptors. In the same vein, from the database in (14), we were only able to add three additional cases: the remainder either had insufficient information about social-science aspects, or proved to be proposed PES schemes (e.g. in project documents) where payments had actually never come to take place.

Hence, while we believe many more real-world PES schemes than in our sample likely fulfil our functional criteria, not many cases in the literature described sufficiently our targeted features of design (degree of payment differentiation and spatial targeting) and implementation (type of monitoring and sanctions applied): the analytical criteria proved to be fairly restrictive.

Applying these filters and eliminating overlap between the original three databases, resulted in 70 distinct PES cases in our merged global dataset. Geographically, North and South America dominate (18 initiatives, respectively), followed by Asia (14), Africa (13), Europe (6), and Australia (1), with the majority of schemes (77%) being located in non-OECD countries. Over one third of the cases (27) started implementation before the year 2000, with an acceleration in the number of implemented cases hereafter. Most of the 70 PES schemes targeted terrestrial ecosystems (36), followed by schemes focusing on land-water interactions (32), while two targeted marine ecosystems. The average PES size is 770 ha, but varies vastly, from micro-watershed initiatives of less than 50 hectares to multi-million hectare programmes such as the US Conservation Reserve Programme or the Chinese Sloping Land Conversion Programme. Most of the schemes targeted watershed ES (31), followed by biodiversity conservation (19), multiple agricultural ES (12), and climate change mitigation (8). 39 initiatives are publicly funded, 29 privately, while two programmes have mixed financing sources. Just over half of the cases (36) feature local beneficiaries, 20 percent (14 schemes) national and 29 percent (20 cases) have international beneficiaries.

It was important for our analysis to capture the degree of sophistication in certain parameters of essential PES design and implementation. For instance, we regarded a payment 'undifferentiated' when the same amount was paid for every unit enrolled – typically for every contracted hectare, though sometimes per contracted landowner. All other schemes we would by default consider ‘differentiated’ in our simple binary classification of payment diversification.

Similarly, some PES schemes preferentially enrolled participants according to a pre-analysis of whether the offered land area offered potentially high ES gains (e.g. biodiversity hotspots or carbon-rich forests), thus either constituting a spatial targeting of ES density (code=1) or not (code=0). Similarly, some PES implementers explicitly pre-classified potential participants according to the associated degree of threat/leverage (i.e. potential for change) they posed on ES delivery vis-à-vis a business-as-usual baseline, e.g. by predicted deforestation risk (code=1), while others would abstain (code=0). Our spatial targeting classification thus distinguished three levels: a) no targeting, b) either ES density or threat targeted; and c) both density and threat targeted.

Finally, enforced conditionality refers to the degree of combined sequential effort put into monitoring and sanctioning of noncompliance, respectively. We first classified whether PES implementers monitored land-use changes, ES changes, or both – and with what frequency. Second, we assessed if there was any history of enforcing sanctions (e.g. warnings, suspending payments, partially and/or temporarily, or permanently) when service providers had failed to comply, using three thresholds: a) sanctions never applied, b) infrequent or uncertain use, c) sanctions consistently applied.

In some cases of incomplete information in the literature sources, we added our own collective field knowledge about the implementation aspects of specific cases; in a few others, we contacted key PES implementation stakeholders for initiatives where persisting doubts needed clarification.

Data availability

All data to support the findings of this study are being made available online in a Supplementary Information (SI) appendix.

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Author contributions

Two workshops were organized by R.B., U.P. and SE, where the concepts were laid out by R.B., U.P., S.E., R.M, and S.W. Case study data were adapted and processed by R.B., D.E.B., R.P. and S.W. Maps were prepared by R.P. and R.B. Finally, S.W. wrote the paper, assisted by all co-authors.

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Fig. 1. **Payment diversification and PES design in public and private programmes worldwide.** Public PES schemes dominate area-wise, except in Africa. Diversified payments have been more acceptable in OECD countries (Europe, North America, Australia), compared to Asia and South America.

Fig. 2. ES focus, spatial targeting, and enforced conditionality of PES programmes. Watershed and biodiversity focused PES are more inclined to target high-density ES areas for enrolment than programmes focused on carbon and multiple ES. Yet, ES focus plays no role for explaining the differential degree of enforcing conditionality in PES programmes worldwide.