Oasis Project Rural property in Sao Paulo, Brazil
Photo: Carlos Eduardo Frickmann Young

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CHAPTER 1

Co-investment in ecosystem services: global lessons from payment and incentive schemes

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Highlights

- Nature cannot be valued, but the services that people derive from it can and land use decisions to protect or enhance such services can be supported by economic incentives.
- Effects of land use on human being, on-site and off-site, are normally a mixture of positive and negative impacts on the various layers of a human well-being pyramid.
- Provisioning services, for which markets usually exist, tend to get prioritized over regulating and cultural ecosystem services, unless these other services are actively supported.
- Economic incentives ("payments for ecosystem services", PES) are part of a policy bundle of regulation ("sticks"), incentives ("carrot") and internalized motivation ("sermons").
- We present a framework for analysing the way PES instruments have so far been used, with testable propositions on ecological, economic, social and policy aspects.

1.1 Introduction

Nature cannot be valued, but the services that people derive from it can. No amount of money can buy us a new planet Earth with its natural history. However, where money is made in destroying its rich natural capital, money might shift human behaviour towards less destructive ways of making a living. This could especially be so where people are poor and where the benefits they derive from destroying natural capital are small relative to the damage done and its value to others. However, this basic idea is in reality interacting with complex social-ecological systems in a world of economic and political feedbacks. In a nutshell, that's what this book is about (*and why it has so many pages*).

The Millennium Ecosystem Assessment[1] has popularized a language of ecosystem services, defined as the benefits people obtain from nature (or natural capital). Ecosystem services contribute to human wellbeing through direct utilitarian values as well as through indirect enabling of human capabilities[2]. They are broadly categorized as provisioning (goods), regulating (reduced variability), cultural (intangible wellbeing) and supporting (natural recovery) services. Where most 'supporting' services act at the multi-year or decadal time scale of ecological restoration, there may be a further category of evolutionary services provided by the basic processes that sustain biodiversity on a longer time scale[3,4,5].

Ecosystems, the fabric in which natural capital has evolved and currently functions, are getting degraded by human use, overuse and neglect. Loss of ecosystem services can be gradual and due to clearing of natural vegetation, cultivation of soils, livestock grazing, harvesting of forest

products, or can be abrupt under infrastructural development[6]. As the human population and markets expand, the rate of loss starts to exceed the rate of natural recovery. About 67% of land in Africa is currently affected by degradation[7]. Land use decisions, which often focus on short-term gains in 'provisioning services' typically cause unintended negative social, economic and environmental impacts. Such choices lead to economic growth (faster turnaround of money), but without increase in net wealth[8]. Land use decisions that are primarily driven by the prices of marketed commodities produced, ignore or externalise impacts on nature[9]. This disconnect also leads to consumption patterns that may deplete or destroy the natural base of our human existence – at least locally. As such, markets provide no value incentive for conserving the natural capital, and instead drive its conversion to produce what is perceived as more 'tangible' value. The consequences are often borne by those external to the area that benefits[10] leading to inequities and disparities in the sharing of costs and benefits of particular actions. Those affected could be neighbours or those more distantly linked through teleconnections (distant connections) or future generations.

Externalisation of environmental impacts from land use decisions often is caused by some combination of incomplete understanding of ecological consequences and institutional settings that imply the consequences are borne beyond the direct group for whom land users have learned to care. It is often a challenge to attribute environmental change to particular actions as 'impact'. Estimating and assigning values to these impacts is a further difficulty and determining who is responsible or who should be compensated adds a further layer of complexity[9]. Information is also insufficient as these impacts often occur in small increments which are difficult to measure and assign a value. Yet they have a cumulative effect. Where natural capital is a 'public good' and environmental sustainability is under government jurisdiction, there may be insufficient incentives to include effects on natural capital in private decisions.

We need to understand how ecosystems work by themselves, and how they are modified in socio-ecological systems, if we want to nudge human influence from negative to positive impacts. An ecosystem, like all other systems, implies components (stocks), change (flows), feedback influences (functions) and rules governing these[11]. Positive feedback means that change accelerates, negative feedback that it slows down. Humans and other organisms can alter environments and adapt to these altered environments, generating complex feedbacks in both ecological and evolutionary processes[6]. The balance of (and transitions between) positive and negative feedback govern system behaviour.

Several 'change' or feedback mechanisms (market and non-market-based) have been developed to achieve overall improvement of ecosystems compared to 'business as usual' (BAU). These mainly seek to develop a shared responsibility between actors and stakeholders while at the same time recognizing growth and development aspirations at different levels[12]. The ecosystem services approach is one way of supporting decisions of actors by making the value of ecosystem functions less obscure.

Payments for Ecosystem Services (PES) is a generic term for a broad range of ('market-based') mechanisms aimed at internalising ecosystem services in land use decisions. If a reduction or increase in ecosystem services is measured and translated to actual transfers in the same currency as the direct benefits that are expected from a land use decision, it is easy to adjust such decisions for increased net benefit. PES typically involves provision of payments or rewards by those who benefit from or are concerned about the provision of these services (buyers) to those who can provide them (sellers) on condition that the desired ecosystem services are delivered or processes to generate them are adopted[13]. The minimum system configuration of PES therefore involves:

At least two human groups (those who expect to benefit and those who can be expected to produce more (or damage less) ES).

A combination of regulation, financial incentives (appealing to income and social interests) and respect/recognition/suasion (social and identity interests)

The effectiveness of PES can be evaluated ultimately from changes in land use decisions or their impact on the condition of the ecosystem and the services it provides. Although PES sounds nice and may appeal to both fairness and efficiency perspectives, its implementation has proved to be rather complex[14]. In the following, we'll step-by-step build up what we see as the minimum complexity that any PES will need to take into account in order to achieve the desired change[15].

1.2 Stepwise inter-relations in PES

At the start of our system view is 'land use' (Figure 1.1), interpreted as the three-way interaction between human well-being, institutions and land. Rural people manage land mainly to harvest food, energy and fibre. Part of these harvests can be sold to those outside the local system.

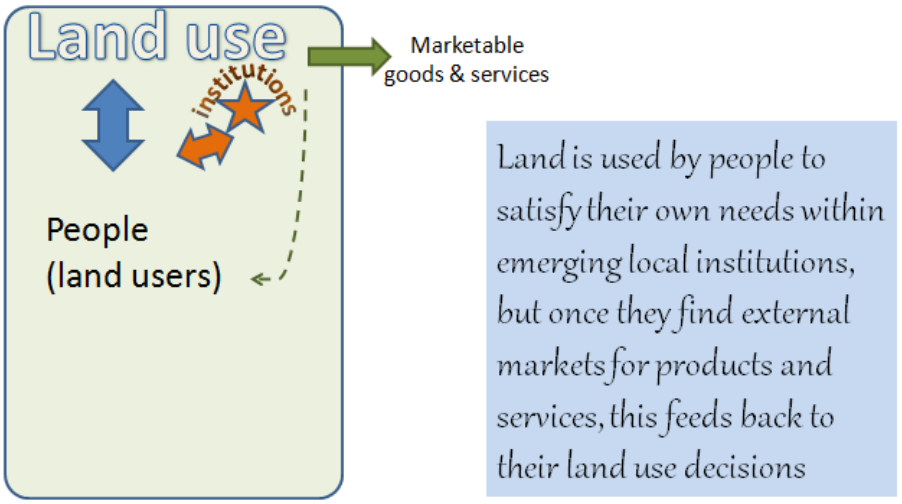

Figure 1.1 Local land use decisions

Human wellbeing is described here (Figure 1.2) using a 7-layered, modified Maslow pyramid building from basic needs for human survival to self-realization, with social relations and income as intermediate layers. The pyramid concept can be applied to individuals, households or communities; most of it also applies at national scale. Commonly made distinctions between provisioning, regulatory, cultural and supporting services relate to different levels of need within this hierarchy.

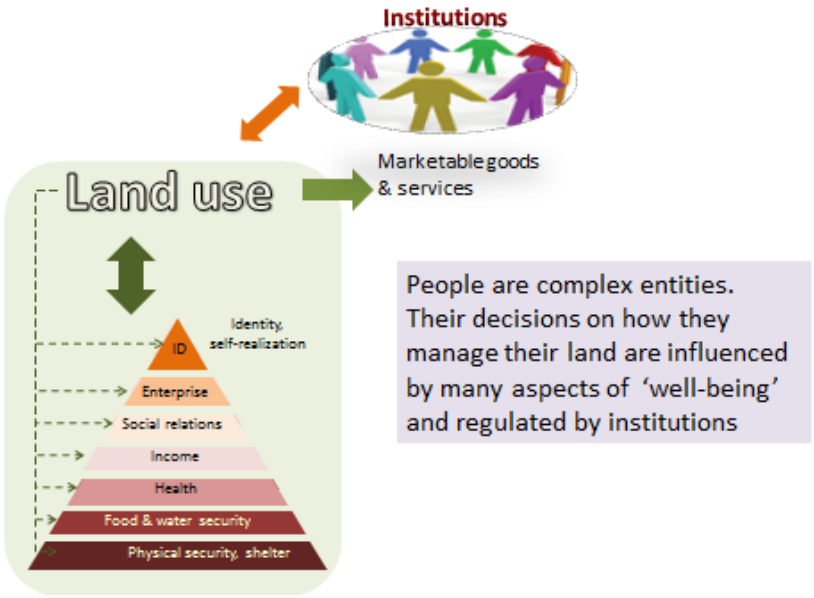

Figure 1.2 Underlying interests at local level

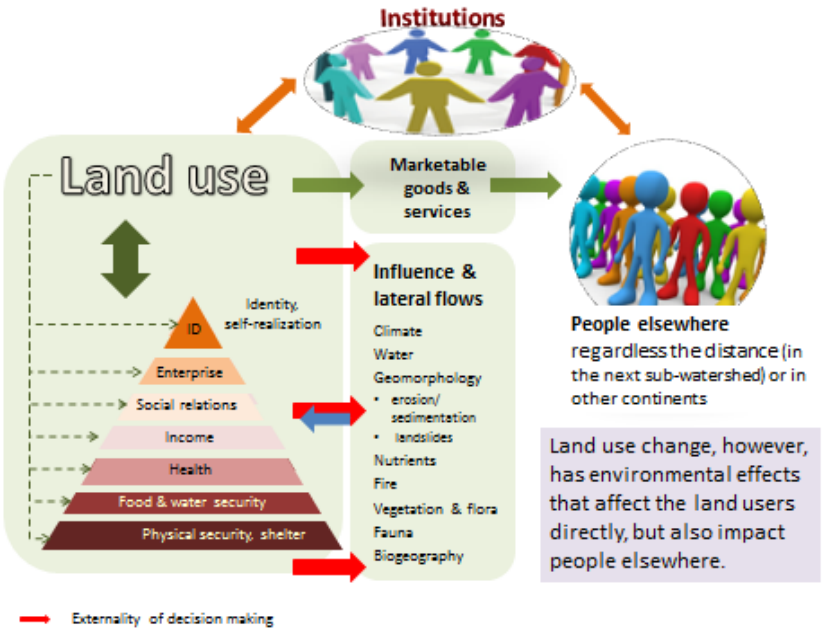

Figure 1.3 Externalities of local decisions

At the local level, too much focus on marketable goods and services, which satisfy enterprise, social relations and income wellbeing needs, may have negative effects on basic aspects of wellbeing (Figure 1.3). For example, increased harvests may reduce the quality of water and lands. Such negative effects may, after time lags and scaling up of markets, also affect people elsewhere (those external to production landscapes including those sourcing their food[16] and other needs from it).

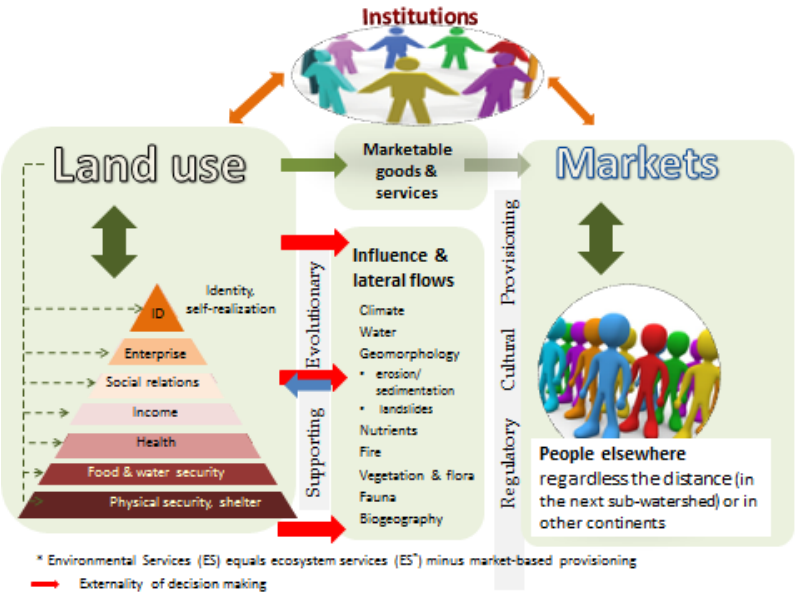

Figure 1.4 Impacts of externalised ecosystem services

In the concept of 'ecosystem and environmental services', negative impacts to others reflect as externalities of land use decision making (Figure 1.4). People elsewhere are the majority and use markets instead of primary land use as the proximate source of (nearly) all goods and services. Nonetheless, they are potentially affected by the impacts of land use, whether in their neighbourhood or at distance. Impacts of ES scarcity tend to progress down the wellbeing needs hierarchy, from higher levels where alternatives can be obtained to basic levels where survival is threatened.

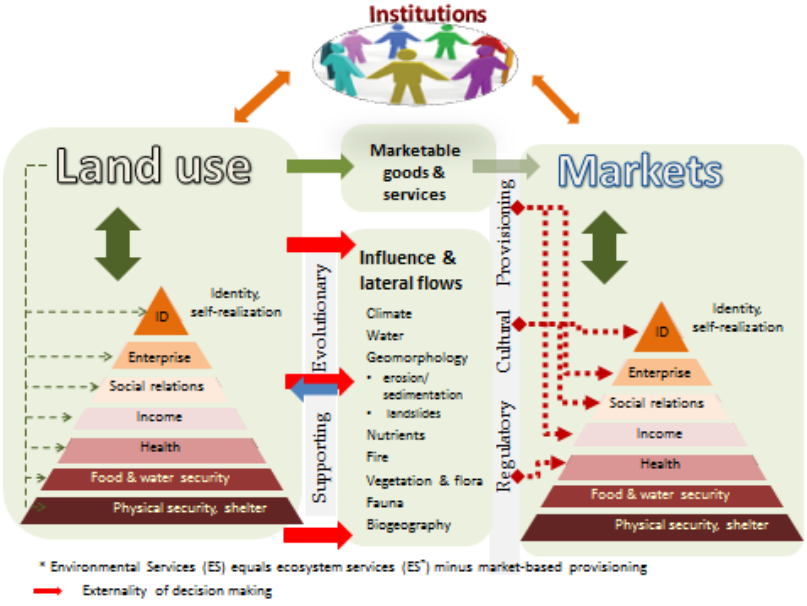

Figure 1.5 Response to ecosystem service scarcity

Where a lack of environmental services (ES) becomes an issue (Figure 1.5), people have a choice between:

1. Moving on, starting afresh elsewhere
2. Trying to control or regulate those who damage the ES
3. Using engineering of the landscape (e.g. reservoirs in rivers)
4. Using economic incentives to change the land users' choices and behaviour
5. Boycotting (uncertified) products damaging ES
6. Trying to convince those who damage the ES to change their behaviour

Option 1: Move elsewhere

Moving elsewhere when the local land use system has been intensified beyond carrying capacity (at existing level of technology) has for most of human history been the major solution. It has roughly brought us where we are – but reaching the edge of planetary boundaries, this solution is no longer realistic, except for the richest groups. It is not a systemic solution.

Option 2: Forbid pollution, regulate land use

In all situations where those external to the landscape under consideration have superior military or political power or rights, they can forbid pollution, regulate land use, use economic instruments such as cap and trade, taxes and subsidies or declare major parts of the landscape off-bounds for local people under forest rules[a].

Option 3: Engineer to reduce ES dependence

Engineering the landscape has, especially in the case of water flows been a major way to improve regularity of flow, storage for periods of shortage, and improvement of water quality for domestic use – reducing dependence on upstream land use. Engineering solutions to single ES challenges may be cheaper than investment in recovery of the ecosystem over a long time scale, but this would ignore tradeoffs of all other services the ecosystems provide.

Option 4: Make Payments for Ecosystem Services (PES)

PES involves provision of economic payments or rewards on condition that desired ecosystem services are delivered or processes to generate them are adopted. It involves *voluntary* performance-based contracts based on mutual interests negotiated between ES sellers (directly managing land use) and buyers (external to the landscape) outside legal obligations. As long as these mutual interests persist, PES has the potential to drive itself perpetually. The *conditionality* principle ensures that for buyers, investment or effort is *efficient* as it is explicitly targeted and can be measured against outcome. As PES is one of many possible feedbacks, its effect on the ecosystem depends on all other feedbacks that it interacts with.

[a] Actually the word 'forest' is derived from lines drawn on maps that indicate a *sylvaforestis* (derived from Latin forex = boundary) as woodland vegetation beyond local village control, and claimed by nobility or kings.

Option 5: Boycott Products without Certification

Negative economic incentives can be effective means, early in an 'issue cycle' to raise awareness with a broader public that there are valid concerns with status quo. Typically a phase of 'denial' is followed by acceptance that there is in fact opportunity to improve management processes between the worst and best ways, referred to as a 'management swing potential'. Eco-certification demonstrates this improvement and tries to gain trust from consumers to 'not boycott' and may even offer some price premium.

Option 6: Link the institutions and identities

Where PES (option 4) emphasized 'efficiency', primarily from the perspective of those who pay, in the landscapes that influence ES the sense of 'fairness', of being recognized and respected is at least as important. More mutualistic institutional relationships can play a large role in 'internalizing' externalities by appealing to wellbeing aspects at the 'top of the pyramid'.

As can be seen, PES is one of the various options available for ensuring sustainable flow of ecosystem services. In the rest of this chapter, we focus on PES providing key concepts for analysing its performance and evolution within the developing world. How has PES been applied and to what extent has it created the desired change in land use and ecosystem services provision? The PES concept has taken on various forms when applied in diverse biophysical and socio-economic contexts, leading to an evolution in the understanding of PES from regular conditional payments by the buyer to the seller to Compensation and Rewards for Environmental Services (CRES) based on negotiated agreements among stakeholders for the purpose of enhancing, maintaining, reallocating or offsetting damage to environmental services, to co-investment in ecosystem services.

In a recent revision of the most-cited PES definition, the degree of conditionality of contracts is the primary, supposedly efficiency-enhancing factor that distinguishes PES from other mechanisms. Others see the use of positive incentives as the philosophy behind PES and conditionality as the method for influencing behaviours. We now recognize key 'paradigms' as commodification (where ES become tradable commodities themselves or in the case of eco-certification, are considered as part of other tradable commodities), compensation (considering foregone legal opportunities) and co-investment. The understanding coming from applying PES in the developing world context has also developed to show that mixing market and poverty alleviation objectives cannot be avoided and is often critical for achieving sustainability although this needs to be carefully balanced.

The PES concept involves some level of complexity, which becomes apparent in operation under different contexts. For example, PES must harmonise interests and power relations of buyers, sellers and intermediaries while at the same time complying with prevailing social, cultural, overarching policy and institutional contexts. Making PES rewards conditional to delivery of specified ecosystem services implies some sort of disaggregation of ecosystem services to levels that allow allocation of a value or metric. Although markets may fail to capture the true value of ES[6] because they overlook the intrinsic and welfare values beyond just services, the PES approach seeks to at least secure part of this value from a human-centric perspective. It should however make payments for ES generation more competitive than alternative options, which may not always be possible. In some cases, possibly due to insufficient information, or preference for relationship building, this level of conditionality is not adhered to and instead of payments 'encouragements' or incentives are used. Although it is assumed that rewards or payments can be used to produce the expected outcomes, this is not always the case as responses may vary with how recipients view the source of the money and may even crowd out pro-social behaviour and interdependence in nature. PES actions in one location, may cause increased degradation elsewhere, an aspect well demonstrated in carbon agreements, but less

so with regards to other ecosystem services. Nevertheless PES has been applied and because of its efficiency and fairness principles, promises to achieve even wider and more sustained land use improvements if some of these challenges are addressed.

This book examines the extent to which PES has worked as a theory of change within the developing world based on evidence from practical case studies in various contexts. The book provides and reviews arguments why specific forms of pro-poor payments or rewards for ecosystem services can be a viable approach towards land use practices that ensure sustainability. While theory should drive practice, the PES literature demonstrates a general agreement that theory and practice can both benefit from learning in interaction. Therefore the discussions examine PES as something between a theory driving practice, and one towards which certain incentives-based practices converge. A theory of place (Box 1.1) is also examined by analysing the extent to which prevailing conditions influence both PES design and outcomes.

The book is primarily aimed at providing new insights for supporting development practitioners on appropriate leverage points for increasing the potential of PES to deliver desired outcomes. It has become popular parlance to refer to such as a theory of change (Box 1.1). The book is also aimed at stimulating debate among scientists and analysts with respect to PES as a theory of change in the developing world context and where new models or knowledge are needed. Finally, the book seeks to recommend appropriate interventions for policy makers on applying PES as a tool for sustainable land management in contexts where poverty is rampant, the coverage of business activity is low and finances need to be better targeted.

Box 1.1 Theories of (Agency for) Change, Theory of Place

Analysts of language have identified observational archetypes of sentence structures describing *change* (A change from state P to state Q), *movement* (B moved from position X to Y) and *difference* from quantity M to quantity N. These basic sentence structures may relate to innately different brain structures. Outcomes, especially those that are either desirable or to be avoided, are associated with context and the set of conditions under which they were encountered. This may lead to inferential *causality* (C caused A to change; or C caused B to move). Much of the success of science is to decontextualize such observations, and to recognize generic patterns that can be distilled to a 'cause-and-effect' language. In complex systems the multitude of cause-effect may become intractable, and focus can shift to the strength and dynamics of feedback loops, rather than the specific cause-effect pathways these depend on.

To a scientist, a theory of change is a theory of how observable change can come about in response to external and internal feedback loops in a system. It is likely to consider a wide array of possible types of change (differing in direction and intensity). To a development practitioner or anybody trying to get investment into a new effort, a theory of change infers causality of their actions leading to desirable change. It is a theory of agency for change, focused on how to achieve specifically desirable outcomes. This focus on change and mechanism must be balanced by an effective way of describing and analysing context: a Theory of Place that contextualizes options for change.

In the remaining part of this chapter, we present an overview of four major starting points for PES, around which the rest of the book chapters converge. These are:

i) ***Ecological*** aspects including land use decisions that can be influenced by markets for ecosystem services; the diversity of ecosystem services and various classifications for such[17]

ii) ***Economic*** considerations within five scales of economics

iii) ***Social*** considerations, including 'common but differentiated responsibility' and 'free and prior informed consent'

iv) ***Governance*** (centralization, decentralization and recentralization) trends of ecosystem management at national and local levels, and the regional and global influences and demands on ecosystem management

Box 1.2 A theory of everything or theories of anything

In physics the quest for unification of all existing laws into a theory of everything, out of which existing laws and constants would follow as logical necessity, has so far failed to achieve its target, despite the promise of 'string theory'. In contrast some focus now on theories of anything, stating that almost any combination of laws and constants may exist somewhere in the universe, and that what we happen to observe in our own universe is little more than an accident.

Similarly, in the social sciences, there is a candidate for a theory of everything, economics, which expects money to be a universal driver of human decisions, and a tradition, ethnography, that starts out as theory of anything, without pre-structured ideas on how people behave and make choices individually and in groups. PES theory has to find its place between these two perspectives.

1.3 Ecological propositions

Land-use change impacts can be positive or negative at different spatial and temporal scales. A major objective of PES is to motivate land use practices that cause changes in the biophysical environment in order to restore or enhance ecological or natural processes that are beneficial for wellbeing. The effectiveness of this therefore requires clear definition and quantification of the changes needed and the ecological or natural responses expected from them. Biophysical aspects include water, geomorphology (erosion/sedimentation, landslides), nutrients, flora and fauna, fire incidences, climate, biogeography, etc. Ecological processes could broadly include watershed functions, carbon sequestration, biodiversity conservation, pollination, biological pest control and landscape beauty[1]. The changes that PES seeks to influence result from human decisions for land-use changes (such as transitions in tree cover and diversity), operating within historical decisions as well as current decisions happening elsewhere in space. PES itself creates ripple effects across the landscape that determine the overall ecological effect, for example, PES can also cause scarcity in products or services needed for daily livelihood either by restricting access or skewing land use towards just a few functions, and can cause negative actions elsewhere resulting in no net ecological gain, a risk highlighted in many carbon PES projects.

Discussions on the ecological aspects of PES will revolve around the following propositions.

E1 Ecosystem service provision from agricultural landscapes is influenced by the existing combination of land use practices, how they are distributed spatially, how they interact with each other and how this changes over time.

E2 Intensification of land use through increased use of external inputs and removal of land cover types that provide key ecological functions in the landscape is associated with degradation of important ES even where the provisioning service is enhanced, but ecological intensification and restoration pathways can reconcile productivity and ES delivery.

E3 A threshold spatial and temporal scale determines if land use changes generate realistic and measurable outcome, and how well a land use status is buffered against minor changes in the future.

1.4 Economic perspective

Economics is often seen as the best candidate so far of a theory-of-everything of human behaviour (See Box 1.2). Payments for ecosystem services seek to address the economic trade-off at the individual level involved in the adoption of land use practices that are beneficial in ecological terms and for the broader society. The approach operates on a series of assumptions

i.e. that demand for ecosystem improvement, and willing buyers and sellers exist; that a fair price/payment can be determined; that payment will motivate behaviour change; and that observable improvements in ecosystem service flows will be generated. With broad considerations of reward options between stakeholders, PES can be achieved at modest cost[18]. Given that ecosystem services are public goods and essentially 'free', the amount is based on negotiation by the stakeholders, sometimes guided by market demand and supply forces, deliberate compensation of opportunity costs involved, or the actual value of the ecosystem service. Payments, incentives or rewards range from being simple unidirectional transactions to exchanges of multiple assets (financial, natural, human, social and manufactured capital) between sellers and buyers. Sometimes the value of payments lies in the regularity of disbursements, enabling households or communities to plan with more certainty.

The conditionality principle of PES aimed at efficiency or value for money is applied in various forms ranging from payments based on proof of delivery of a specified ecosystem service (ES), proof of actions to deliver that ecosystem service to trust that land use actions agreed upon by stakeholders in land use plans will deliver desired ES outcomes. Payments may focus only on additional ES delivered or on overall demonstration of good practices that ensure future flows, depending on what is negotiated. Although literature on PES efficiency is dominated by discussions from the perspective of the ES buyer the perspective of the seller where effort invested is duly rewarded or affirmed is critical too as a pro-poor safeguard against leaving local people worse off, which can result in dwindling of performance over time.

The scale of land use change needed has major cost implications as commitments may require engagement of multiple stakeholders over long time periods. While these costs are often minimised on the side of ES sellers by building on existing local institutions and networks, convening collective action amongst ES buyers to achieve the necessary scale has been a challenge in many situations.

Economic considerations in decisions regarding the allocation of resources and prices of goods and services are made at different levels ranging from pico- (human-being), micro- (individuals, household), meso- (landscape) and macro- (country, global) economic (Figure 1.6).

Figure 1.6 Five scales of economics that are important as part of the PES debate[13]

The five scales of economics with which PES interacts are:

***Giga*-economics or 'ecological economics' starts from planetary boundaries in which human livelihoods have to fit**

***Macro*-economics deals primarily with the way nation states can, in interaction with the (trans-) national private sector, manage scarce resources; many economists now recognize that this has go beyond the conventional focus on GDP and include a 'human development' or 'social progress' index**

***Meso*-economics or 'environmental economics' tries to fit environmental issues into a mainstream economic frame, through concepts such as price and markets, to interact with intangible 'value', targeting internalization of 'social externalities' of private decision making**

***Micro*-economics deals with decision making on the use of scarce resources at the individual, household, farm or small/medium enterprise level where prices tend to be exogenous (externally determined)**

***Pico*-economics or 'behavioural economics' deals with actual decision making by *humans* rather than the *econs* studied under conventionally implicit 'rationality' assumptions.**

***Giga*-economics or 'ecological economics' starts from planetary boundaries in which human livelihoods have to fit**

Interacting with these five scales, three temporal scales are important and cannot be easily reconciled by use of a discount factor:

1. the *here-and-now* scale of efficiency considerations;
2. the sustainability and social capital scale of persistence of current livelihoods' options, protected from negative externalities that feed back to the decision maker; and
3. the continued change or ***sustainagility*** scale in maintaining a resource base for future adaptation to deal with as-yet unpredictable challenges and options.

Decisions tend to favour benefits accruing to the individual as opposed to those accruing to others[16]. However, farmers may respond to market opportunities created by PES using a moral economy where all livelihoods are protected or co-investment in the ES improvement for a share of the profits or perceived benefits. These economic considerations are discussed further based on the following propositions.

C1 An ES-friendly production system can, through generic co-investment, expect to achieve 80 percent of production potential; beyond that there is likely to be a stronger trade-off that can be influenced by economic incentives.

C2 Decisions for shifting towards ES-friendly production systems are only partially driven by financial considerations and prices of goods and services.

1.5 Social

The social perspective contributes to the debates of achieving efficiency while ensuring justice, rights, inclusiveness, ethics of public goods and trust. The tendency for potential ecosystem service sources to be located in landscapes often lived in by poor people with poor infrastructure and insecure land tenure, makes aspects of fairness and being proper critical if PES is to be

successful. At the minimum, PES should avoid making people worse off (see Box 1.3 "first do no harm"). **Pro-poor** objectives in PES can be diverse, seeking to benefit many rather than a select few[16], ensure that the poor participate in decisions affecting them, and promote land use changes that generate household level benefits such as food, livelihoods, resilience to extreme events etc. While pro-poor goals are ethical and sometimes contribute to overall efficiency in PES, they come with high costs[16,19] related to unclear land tenure, transaction costs, opportunity costs and demanding upfront investments for adopting new land use practices. The outcomes are not always positive for the poor and vulnerable, leaving them dissatisfied as in the case of the Noel Kempff project in Bolivia. In the broader landscape sense, conflicts may emanate from lack of trust and miss-attribution land degradation causes and solutions to wrong locations or practices.

Box 1.3 First do no harm

A basic concept in the training of medical personnel, is that well-intentioned interventions can in fact do more harm than good. The medical concept "*Primum non nocere*" can be translated as "first of all, do no harm". It doesn't mean that doing no harm is sufficient, but what counts are the actual impacts, not the intentions to do good.

Sustainable ecosystem functionality emerges when landscape management options are relevant to local problems and are based on principles of respect, inclusivity, consultation and harmonization ('co-production') of knowledge currently segregated in the domains of local, the public/policy and scientist/modeller ecological knowledge as was observed in the case of Sasumua watershed (Figure 1.7).

Figure 1.7 Harmonising interests using scientific evidence and consultation in scoping for PES financing for Nairobi water in the Sasumua watershed, Kenya

Motivation of land use decisions by PES depends on what is perceived as fair, which is expressed in the size of the *incentive/reward or payment* offered, the *process* including recognition, trust and respect, and *outcome* where benefits are shared equitably between sellers and buyers and amongst these different groups[20] taking into consideration investments made such as land and effort, by different groupings according to gender, land ownership, wealth, age etc. Enabling participation in decision making, inclusion into local institutional settings, access to more services and extension advice, and access to formal land tenure registration are described as preconditions for PES[18], but they can also be negotiated outcomes of PES. **Fairness** can refer to a notion of equity or justice[18] in the process of structuring PES agreements, how responsibility and benefits are shared among stakeholders, and whether the reward rightly reflects the value of the ecosystem service or compensates the opportunity costs of adopting desired land use options. In many cases, the process of negotiation, which provides some sort of rewards in form of social capital exchanges is a very important pre-step to actual payments[21]. As a voluntary mechanism, PES involves negotiation and relation building based on mutual interests primarily between sellers and buyers who may be geographically distant from one another, and who may also differ in social status, power and information access[18,22]. Intermediaries (brokers, regulators, developers etc.) can play a key role in ensuring that PES agreements are fair. Discussions will address the following social propositions:

S1 Voluntary and mutually agreed PES criteria and indicators are essential in ensuring performance.

S2 Implementing PES can increase poverty among poor segments of society who are disproportionally vulnerable to loss or lack of ES

S3 When envisaged beyond an ES commodification mechanism, PES has potential for enhancing social capitals among community members, internally and externally.

S4 PES requires boundary work, involving partners willing to go beyond their institutional roles and safe space, through investment, capacity building and facilitating engagements

1.6 Multi-scale (polycentric) governance of socio-ecological systems

The public-policy perspective relates to a system of laws, regulatory measures, courses of action, and funding priorities concerning ES enhancement and ES-friendly practices promulgated by a government. In many situations, ecosystem management is predominantly considered to be a public responsibility with limited role of regular markets and no mechanisms for those that benefit from these services to compensate those that supply them[23]. It is argued by some that market failures are the reason why governments need to play such a central role in natural resource management. However cases of policy failure e.g. perverse subsidies[24] and alienation of local communities also lead to ecosystem degradation. More recent discussions for sustainable natural resource management seek collective action, moving from a place where public interests are nobody's interests, to common but differentiated responsibilities (CDR). PES enables interaction between high level policy or market drivers of land use change with local institutions[25]. Governments can work as PES intermediaries by coordinating sellers and buyers and minimising conflict and free riding. Governance frameworks can boost and ensure a more sustained impact of PES because they operate over long cycles. Existing public structures and governance approaches at local and national levels or global international organisations define property rights and can provide the institutional frameworks for aggregating multiple seller and buyer entities enabling PES[26] to operate at scale, and therefore generate more effective and sustainable impact on ecosystems. Governance and policy perspectives will be discusses under the following propositions.

P1 Leveraging multiple policy instruments, with a mutual 'do-no-harm' at the interface is a necessary pathway for eliciting ES enhancement and delivery.

P2 Enabling global framework and public-policy are necessary to support sustainability and potential upscale of PES

1.7 What to expect in the four sections

The following chapters analyse the weight of evidence of PES practice under these four major group of propositions, using thematic chapters and contextualized case studies to establish what is PES, what it is not, and what is inspired by the PES idea but is in fact different (Figure 1.8). By exploring how PES are applied in the developing world context where poverty alleviation goals dominate, different chapters will analyse the efficiency of PES and its potential application in improving ecosystem management in the framework of sustainable development at different scales.

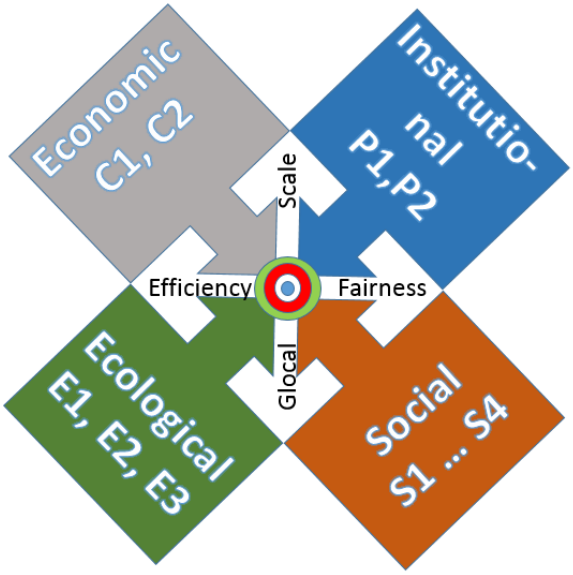

Figure 1.8 Outline of the book, which is organized in four sections that explore the propositions in four groups, all informed by experience in 'learning landscapes' (the bull's eye) that necessarily integrate across the four aspects

In the concluding chapter(s) we will focus on lessons learnt across these case studies and propositions, with attention to emerging overriding issues such as the fairness + efficiency imperative (beyond the perception of a trade-off between these aspects), and the *glocal* (global=local) scale relationship.

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