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Mechanisms of Payments for Ecosystems Services

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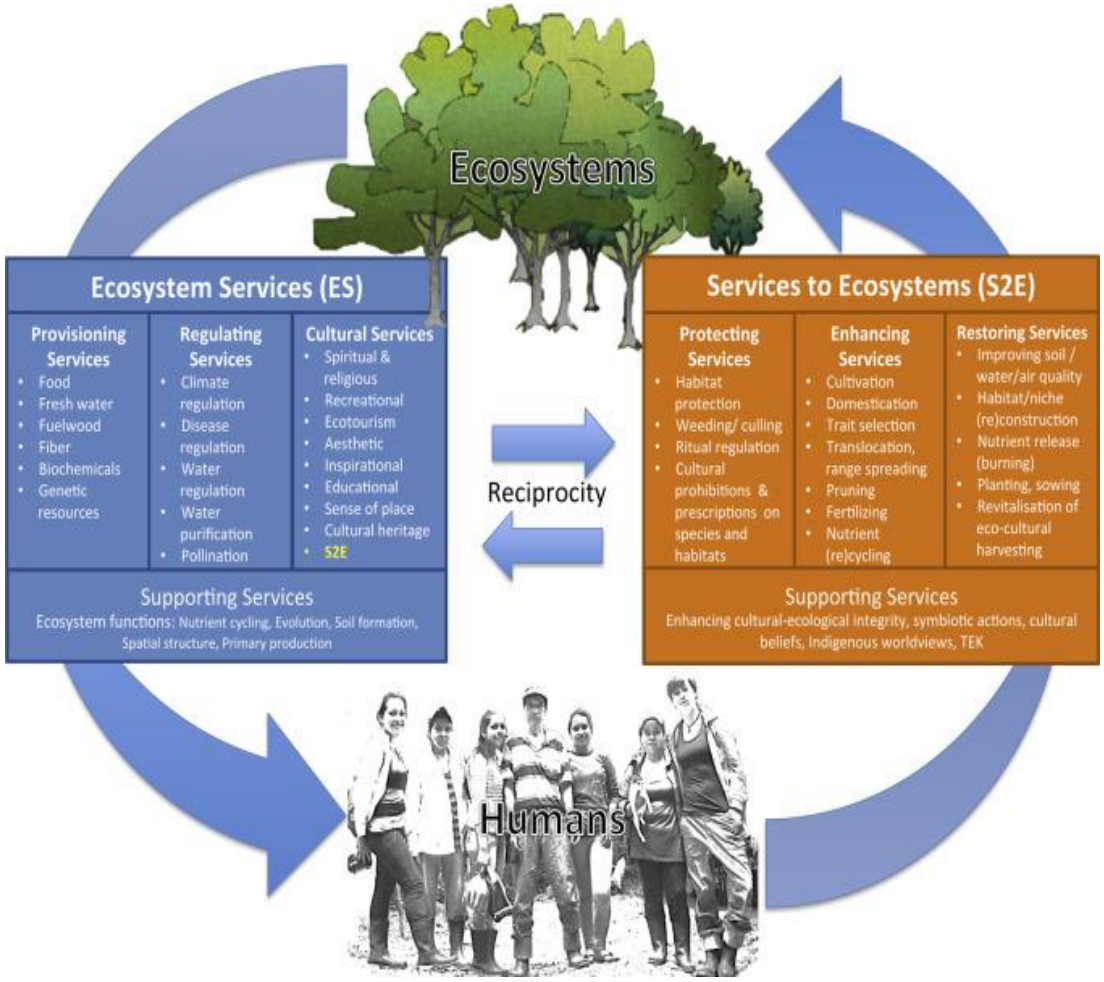

The concept of Ecosystem Services (ES), is widely understood as the "benefits that humans receive from the natural functioning of healthy ecosystems". It should includes actions humans have taken in the past and currently that modify ecosystems to enhance the quality or quantity of the services they provide, whilst maintaining the general health of the ecosystem over time. **Comberti et al. 2015.** *Note the reciprocity* germane to Payments for Ecosystem Services (PES)

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The Concept of Ecosystem Services

May goods and services are endowments from nature (ecosystem) without human effort or input. Some are renewable (e.g. living resources) while others are non-living, finite and thus, non-renewable. These resources are also known as environmental resources which provides ecosystem services that are beneficial to people as a source of commodities and regulating, supporting, and cultural services. Also involves humans activities to maintain the flow of the services. The **blue economy** is an embodiment of environmental resources and the ecosystem services derived therefrom (such as fisheries, aquaculture and water resources, shipping and coastal transportation, mineral exploitation, harnessing energy, coastal tourism, climate regulation etc.) .

The type, quality, and quantity of services provided by an ecosystem are affected by the resource use decisions of individuals and communities. The human-environmental resource interface is crucial for sustainable management.

Concept of Ecosystem Services Contd.

Environmental resources mostly fall in a category of the so-called **"common pool resources"** such as ABNJ (natural resource whose characteristics make it costly but not impossible to exclude the multiplicity of beneficiaries from its use). This generates **"externalities"** (wherein an actor engages in activities that affects the profit of another actor but the cost/benefit is not taken into account). This results in resource misallocation as caused by the **absence of property rights** to the natural resource – hence little incentive for individual to invest in improvement of resource base. This gives rise to two related economic problems:

✓**Rent dissipation** (i.e. the loss of any economic surplus that the resource might have earned)

✓**Overcapitalisation** (i.e. excessive amounts of capital and labour tied up in the environmental resource exploitation)

Both are symptoms **Allocative inefficiency.**

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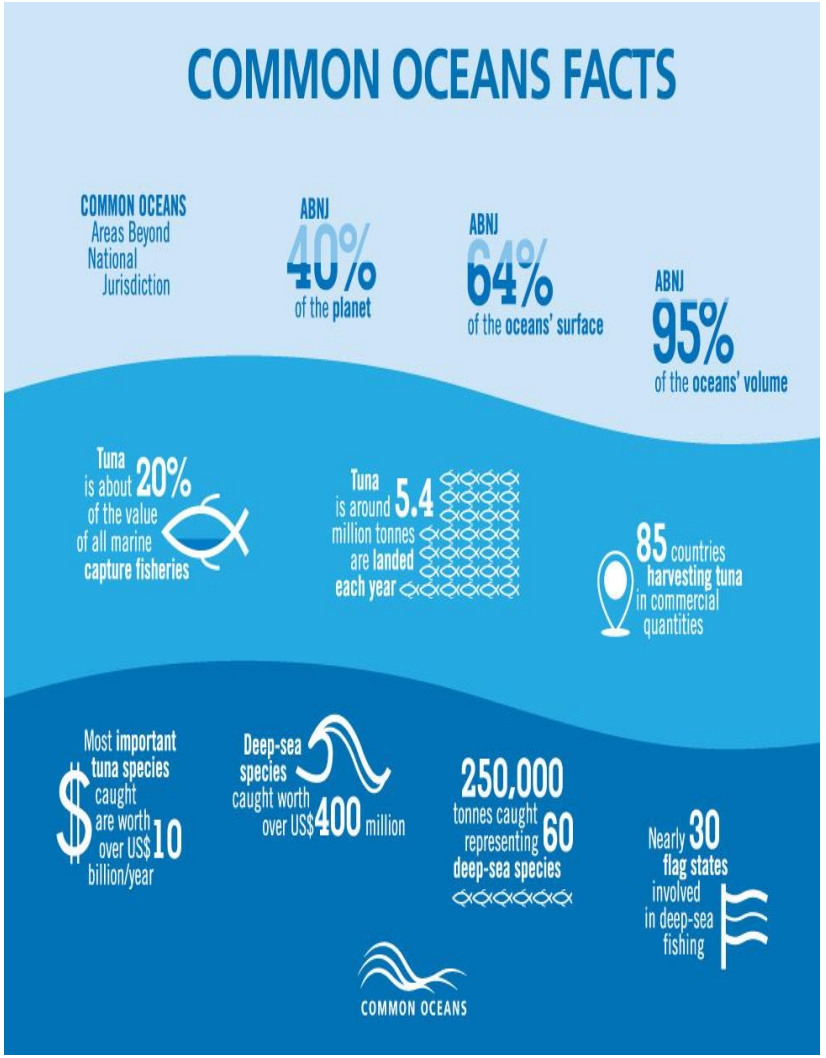

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Total Economic Value (TEV) Concept

Economics demands that the value (or system value) of an ecosystem should account for two separate features. The first is the aggregated value of the ecosystem service benefits provided in a given state, otherwise also know as the concept of TEV. The second aspect relates to the system's capacity to maintain these values in the face of variability and disturbance. The former has sometimes been referred to "*output*" value, and the latter has been named "*insurance*" value.

It is worth noting that "total" in "total economic value" is summed across categories of values (i.e., use and non-use values). The focus should be on the end products (benefits) when valuing ecosystem services in order to avoid double counting of ecosystem functions, intermediate services and final services.

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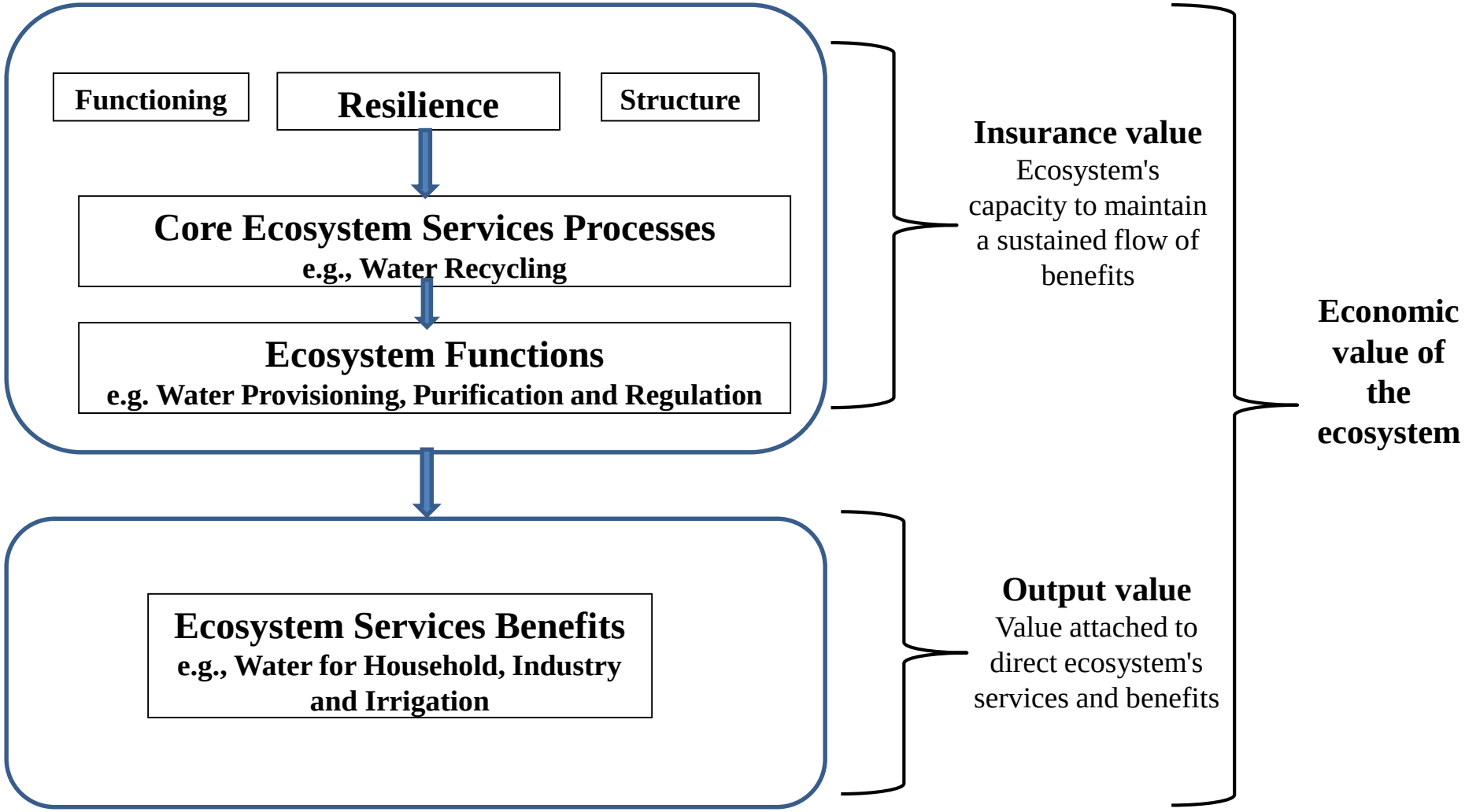
Insurance and Output Value as Part of the Economic Value of the Ecosystem



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The **insurance value of ecosystems** is closely related to the system's resilience and self-perpetuating capacity. The notion of resilience relate to the ecosystems' capacity to absorb shocks and reorganize so as to maintain its essential structure and functions, i.e., the capacity to remain at a given ecological state or avoid regime shifts. Securing ecosystem resilience involves maintaining minimum amounts of ecosystem infrastructure and processing capability that allows 'healthy' functioning. Such minimum ecological infrastructure can be approached through the concept of "critical natural capital". The status of critical natural capital and related insurance values are sometimes recognized by the precautionary conservation of stocks, or setting safe minimum standards.

Benefits corresponding to the **"output value" of the ecosystem** involves such as the mitigation of damages from storms and other natural hazards by mangroves. The elicitation of these kinds of values can generally be handled with the available methods for monetary valuation based on *direct markets*, or, in their absence, *revealed or stated preferences techniques* are used. In order to fully capture the economic value of the environment, different types of economic values neglected by markets have been identified, and measurements methods have been progressively refined. In fact, valuation of non-marketed environmental goods and services is associated with a large and still expanding literature in environmental economics.

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2. Categorisation of Ecosystem Services: Value Typology Within the TEV Approach

Total (output) value of ecosystems has generally been divided into use- and non-use value categories, each subsequently disaggregated into different value components

Value type	Value sub-type	Meaning
Use values	Direct use value	Results from direct human use of biodiversity (consumptive or non consumptive).
	Indirect use value	Derived from the regulation services provided by species and ecosystems
	Option value	Relates to the importance that people give to the future availability of ecosystem services for personal benefit.
Non-use values	Bequest value	Value attached by individuals to the fact that future generations will also have access to the benefits from species and ecosystems (inter-generational equity concerns).
	Altruist value	Value attached by individuals to the fact that other people of the present generation have access to the benefits provided by species and ecosystems (intra-generational equity concerns).
	Existence value	Value related to the satisfaction that individuals derive from the mere knowledge that species and ecosystems continue to exist.

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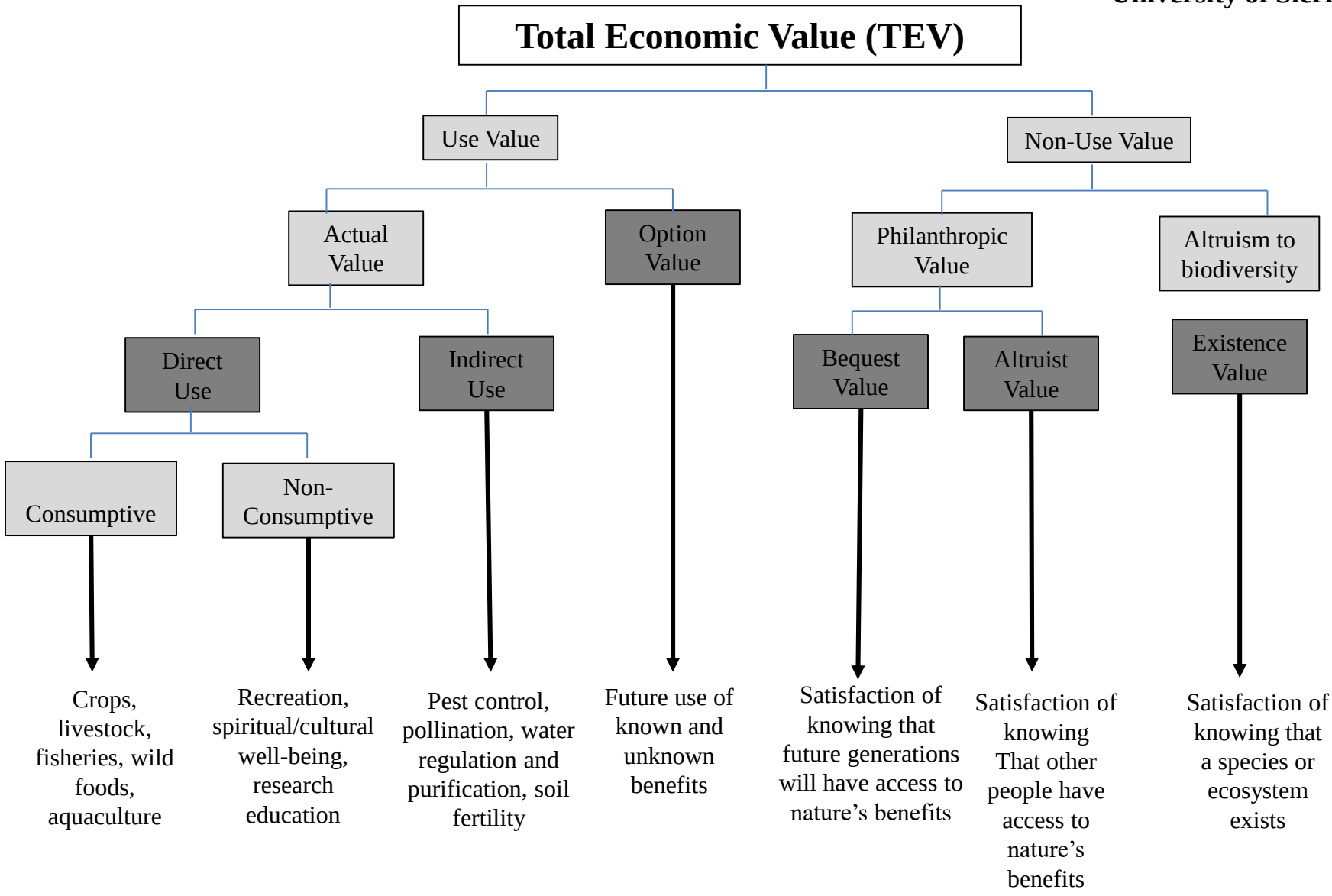

Monetary Valuation Methods and Values with Examples

Methods			Comments/Examples
Market Valuation	Market Price		Mainly applicable to the "goods" (e.g. fish) but also some cultural (e.g. recreation) and regulating services (e.g. pollination).
	Cost Based	Avoided Cost	The value of the flood control service can be derived from the estimated damage if flooding would occur.
		Replacement Cost	The value of groundwater recharge can be estimated from the costs of obtaining water from another source (substitute costs).
		Mitigation/Restoration Cost	E.g. cost of preventive expenditures in absence of wetland service (e.g. flood barriers) or relocation.
	Production Function/Factor Income		How soil fertility improves crop yield and therefore the income of the farmers, and how water quality improvements increase commercial fisheries catch and thereby incomes of fishermen.
Revealed Preferences	Travel Cost Method		E.g. part of the recreational value of a site is reflected in the amount of time and money that people spend while traveling to the site.
	Hedonic Pricing Method		For example: clean air, presence of water and aesthetic views will increase the price of surrounding real estate
Simulated Valuation	Contingent Valuation Method		It is often the only way to estimate non-use values. For example, a survey questionnaire might ask respondents to express their willingness to increase the level of water quality in a stream, lake or river so that they might enjoy activities like swimming, boating, or fishing.
	Choice Modelling		It can be applied through different methods, which include choice experiments, contingent ranking, contingent rating and pair comparison.

4. Mechanism of Payment for Ecosystem Services

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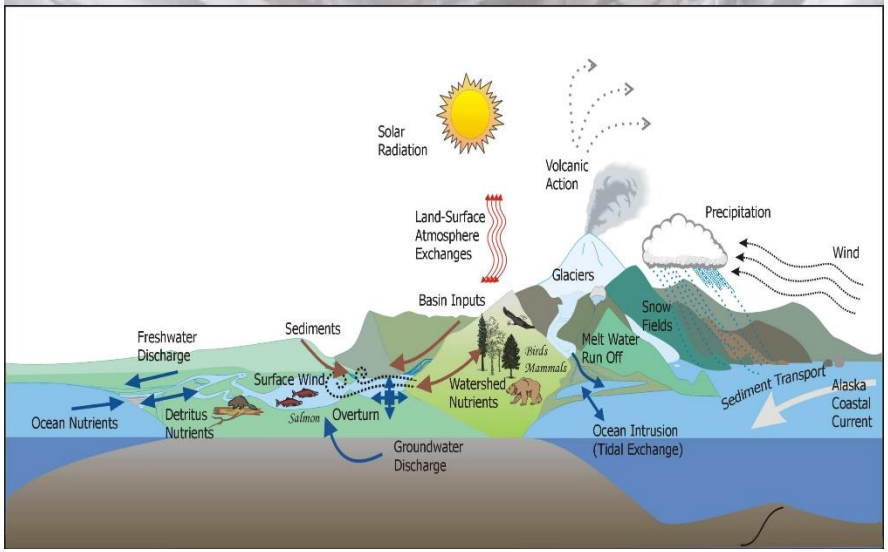
A powerful and emerging standpoint is that ecosystems cannot be rightly considered without recognising the role humans play over time in shaping them and by neglecting to do so, the sustainability of ecosystems may be undermined.

Thus, the cost of the role of humans in conserving ecosystem services constitutes Payments for Ecosystem Services (PES) is the compensation of individuals or communities for undertaking actions that increase the provision of ecosystem services or for providing services to the ecosystem (S2E) e.g., water purification, flood mitigation, or carbon sequestration. PES schemes rely on these incentives to induce behavioral change.



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The incentives could take the form of:

1. Public provision of goods and services
2. Private contracts between the provider and the recipients
3. Encouragement of voluntary efforts by firms and individuals
4. Direct government regulation
5. Hybrid mechanisms such as government-supported trading markets
6. Incentive-based measures such as deposit–refund systems, subsidies, tradable permits e.g. markets for pollution reduction etc.

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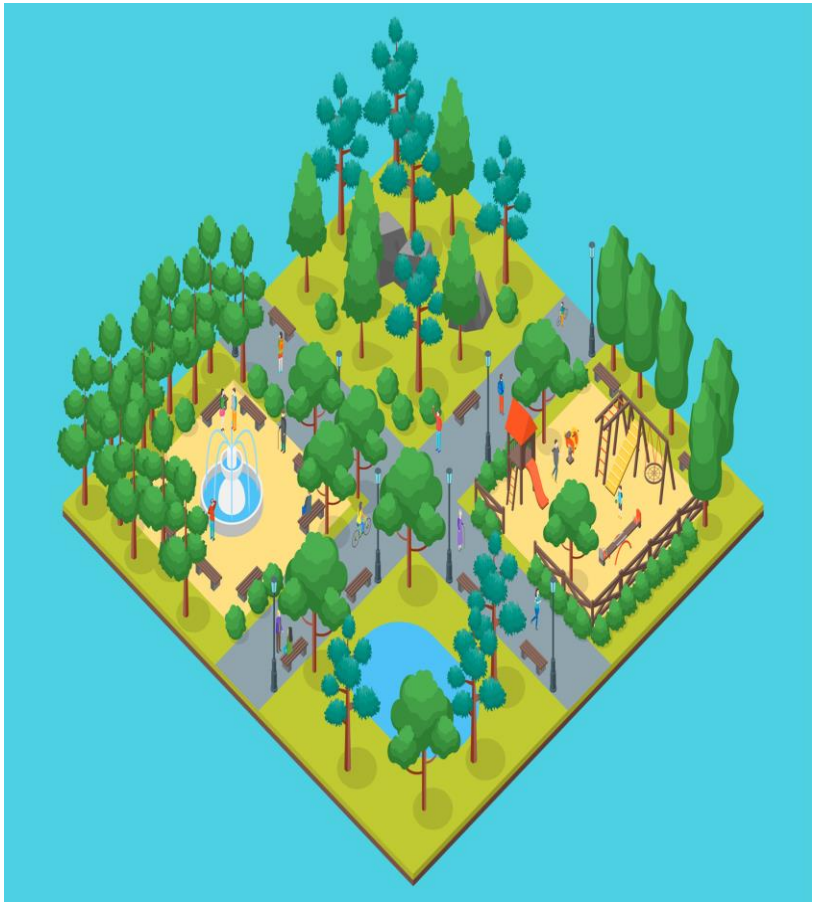
Identification and Feasibility of PES

A. Issues in Identification

The rationale behind payments for ecosystem services (PES) is that a provider of the service should be paid by user in return for receiving a stream of benefits or ecosystem services. Basically, individuals or communities must be paid to undertake actions that increase levels of desired ecosystem services. A number of requirements/principles have been identified:



1. There should be at least one ecosystem service provider (seller) on the condition that the provider ensures service provision permanently
2. There should at least one ecosystem service buyer (e.g., individuals, communities and businesses or governments)
3. There should be well defined ecosystem service
4. Voluntary agreement between buyer and seller
5. Avoiding leakage or securing an ecosystem service in one location should not lead to the loss or degradation of ecosystem services elsewhere.

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The Need for a PES Scheme

Typically a PES scheme can develop either when a depletion or overexploitation of an environmental resource is observed resulting into restoration demand, or a natural resource management objective is identified, and a PES system is introduced to create a market for the service.

Demand – Supply - Market Place

Some examples of application of PES Schemes:

1. Carbon sequestration and storage
2. Biodiversity protection and conservation
3. Watershed protection
4. Landscape beauty in ecotourism.

Enabling Factors:

1. Valuation (quantification of the impact and economic valuation)
2. Legal and institutional frameworks
3. Organization of stakeholders.

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Financing and Cost Considerations

Financing

It is important that financing of PES is sustainable. It generally takes the form of:

a. public payment schemes through which the government pays resource managers to enhance ecosystem services on behalf of the wider public
b. private payment schemes, or self-organized private deals, in which beneficiaries of ecosystem services contract directly with service providers
c. public–private payment schemes that draw on both government and private funds to pay resource managers for the delivery of ecosystem services

Cost Considerations

1. Short-term design and capacity-building costs: e.g., field study data collection for the baseline, stakeholder engagement and contract preparation. Upfront payments to cover seller's costs.

Cost Considerations Contd.

2. Long-term implementation costs: Payments necessary to generate additional ecosystem service provision and to cover transaction costs (all costs associated with buying and selling in a market – **monitor as this could be high and undermine PES scheme**) and all costs of measuring, reporting and verification.

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Payment mechanisms for PES schemes

There are two main mechanisms for PES:8

a. *Performance-based payments*: These are payments made on the basis of the actual provision of the ecosystem service. For example, payments are made for example, a quantified improvement in biodiversity, Forms the basis of PES schemes.

b. *Input-based payments*: Payments based on implementing specified resource management practices for example planting certain acres of mangroves using specified farming system. These types of payments will be used only if buyers are willing to accept that specified inputs/activities will result in the provision of the desired service.

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Scale

PES schemes can be:

a. International: Example Reducing green house gases whereby developing countries that are willing and able to reduce emissions are paid by developed countries
b. National: Wherein Government can finance scheme on behalf of the public in return for more environmentally sensitive resource management (e.g., buyback programmes)
c. Catchment: For example, downstream water users pay for appropriate management of the watershed or upstream land to stabilize or improve water quality.
d. Local/neighborhood: For example, a scheme whereby residents collectively fund the efforts of a professional organization to manage their biodiversity.

B. 10 Step Feasibility Assessment of PES

After: Center for International Forestry Research (2014)

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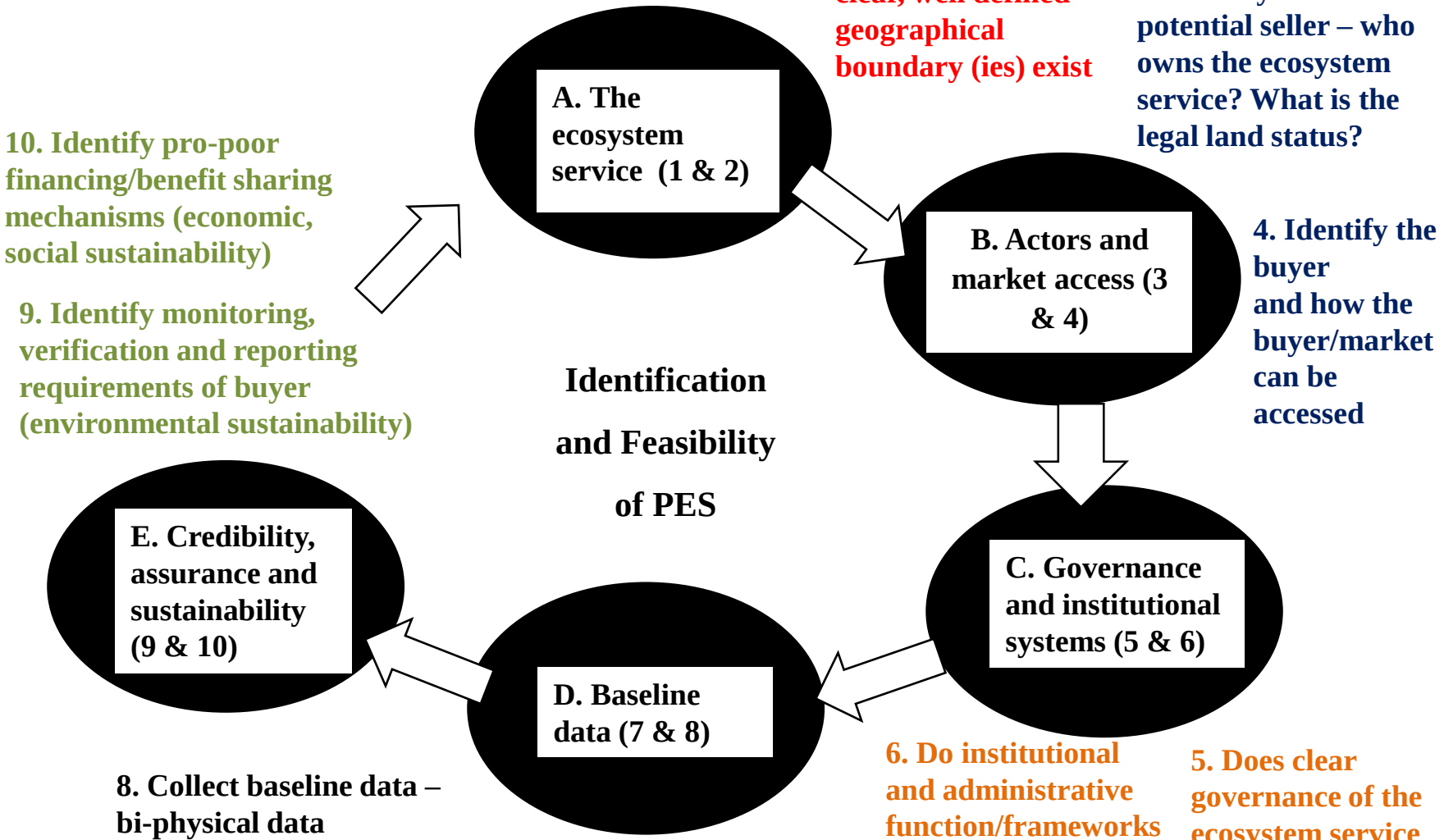

Example: Summary of the 10 feasibility assessment steps for reduction of marine pollution

The ecosystem (1&2)

Step 1: Identify the ecosystem service

What is the ecosystem service that is going to be bought and sold? It is usually obvious what ecosystem service is going to be bought and sold as driven by some sort of problem such as e.g., plastic pollution resulting in fish mortality and undermining safety at sea.

Step 2: Set clear boundaries

Are there well-defined and clear geographic boundaries for the service?
A fundamental requirement for any PES scheme is the establishment of clear, well-defined geographic boundaries. If for example plastic are to be cleared, the catchment area must be defined

Actors and market access (3 &4)

Step 3a: Identify the seller(s): National goods?

Who owns the ecosystem service? Who is legally entitled to sell the ecosystem service? Step 3a considers the need to clearly identify who owns the service and therefore who is eligible to sell the service.

Step 3b: Identify the buyer(s): Public payment scheme?

Who is going to buy the ecosystem service? Is the buyer known to the seller? Having a buyer is required.

Step 4: Identify the market
In what market will the ecosystem be sold: international, national, local? How accessible is the market? What are the rules governing the market? How is the price set?
4a: Access to the market
Determining access to the market is crucial but often overlooked
4b: Setting the price to ensure sustainable financing
The price set has to be satisfactory for both parties.

Governance and institutional systems (5 & 6)
Steps Step 5: Determine governance of the ecosystem service
Are the necessary governance arrangements in place?
It is important that governance of the ecosystem service is clear. It is therefore necessary to understand the governance framework
Step 6: Identify institutional and administrative functions/ frameworks
Are the necessary institutional arrangements in place? An institution to handle the sale of the service is necessary, as for any product that is being sold in a market.

Baseline data (7 & 8)
Step 7: Establish and compare business-as-usual and project scenarios
What is the business-as-usual scenario? How is this expected to change as a result of the PES scheme. Establishing the baseline is a prerequisite for all PES projects.

Step 8: Collect biophysical data
The need for an improvement in the ecosystem service provided, including a shift away from business as usual to an improved situation, is a key principle.

Credibility, assurance and sustainability (9 & 10)
Step 9: Set requirements for measuring, reporting and verification (MRV)
Are systems in place to ensure credibility of the service provision? What MRV will be undertaken to improve from business as usual? In PES, MRV serves to prove adequate performance, to justify payments and, ultimately, to maintain the credibility of the scheme. This role becomes even more important when payments are based on performance, as is the case for most PES.

Step 10: Develop pro-poor benefit-sharing mechanisms
Are fair and equitable means of sharing the benefits in place? Ensuring that the financial, environmental and social gains from the provision of an ecosystem service are equitably distributed is a fundamental requirement for sustainability. Equitable sharing of rewards is particularly critical when the service is provided by a community or a collective of individuals or transboundary resources. To avoid conflict and ensure all costs of service provision are adequately compensated, a fair and equitable system for sharing the rewards should be developed, to the agreement of all parties (***Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits – Convention of Biodiversity***).

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Thank You