Convention on the Protection and Use of Transboundary Watercourses and International Lakes

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Working paper 1

DRAFT CODE OF CONDUCT ON PAYMENTS FOR ECOSYSTEM SERVICES IN INTEGRATED WATER RESOURCES MANAGEMENT
- TECHNICAL ANNEXES -

This working paper contains the technical annexes to the draft Code of Conduct as referred to in document ECE/MP.WAT/WG.1/2006/3, paragraph 9, as annexes II - VI. It should be noted that that the titles of these annexes have been slightly amended to take into account new findings.

Annex II

GUIDANCE FOR THE DECISION-MAKING PROCESS IN PES ESTABLISHMENT

Payments for ecosystem services (PES) are a new approach for internalising the positive environmental externalities associated with ecosystem services. They involve financial transfers from the beneficiaries of these services, i.e. those who are demanding them, to others that are conducting activities, which generate these environmental services, i.e. are supplying them. These payment schemes can be designed and introduced in a context where there are already well defined and measurable links between a certain activity (or conservation practice) and the quantity and quality of ecosystem services. They can also be introduced in a context where there is a change in conservation practice (e.g. land use), which will lead to a change *cum* improvement of ecosystem services.

Although PES schemes can be linked to poverty alleviation strategies, their major objective is to achieve a given environmental goal at least cost, using the market price mechanism.

The first chapter provides a basic flow chart to illustrate some questions to be answered and analyses to be carried out before deciding on the establishment of a PES scheme. Chapter II presents a broad sketch of an integrated framework for the analysis of the impact of a certain project (such as a change in land use) on the quantity, quality and value of ecosystem services and the establishment and operation of PES schemes. The focus is on water-related ecosystem services.

I. A BASIC FLOW CHART

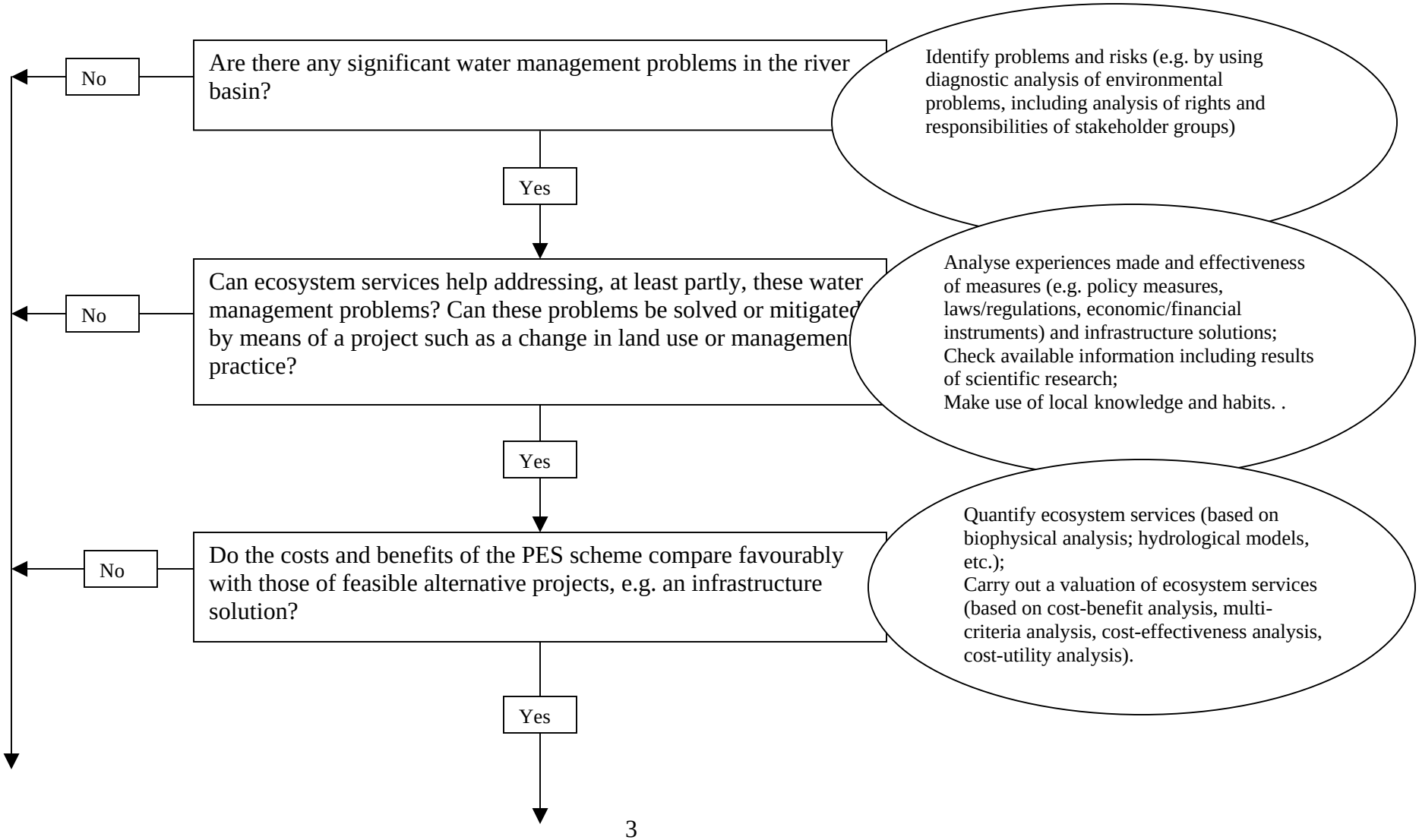
The flow chart seeks to illustrate a set of questions, which have to be addressed and analyses that have to be undertaken in the process towards deciding whether the establishment of a PES scheme is feasible and useful.

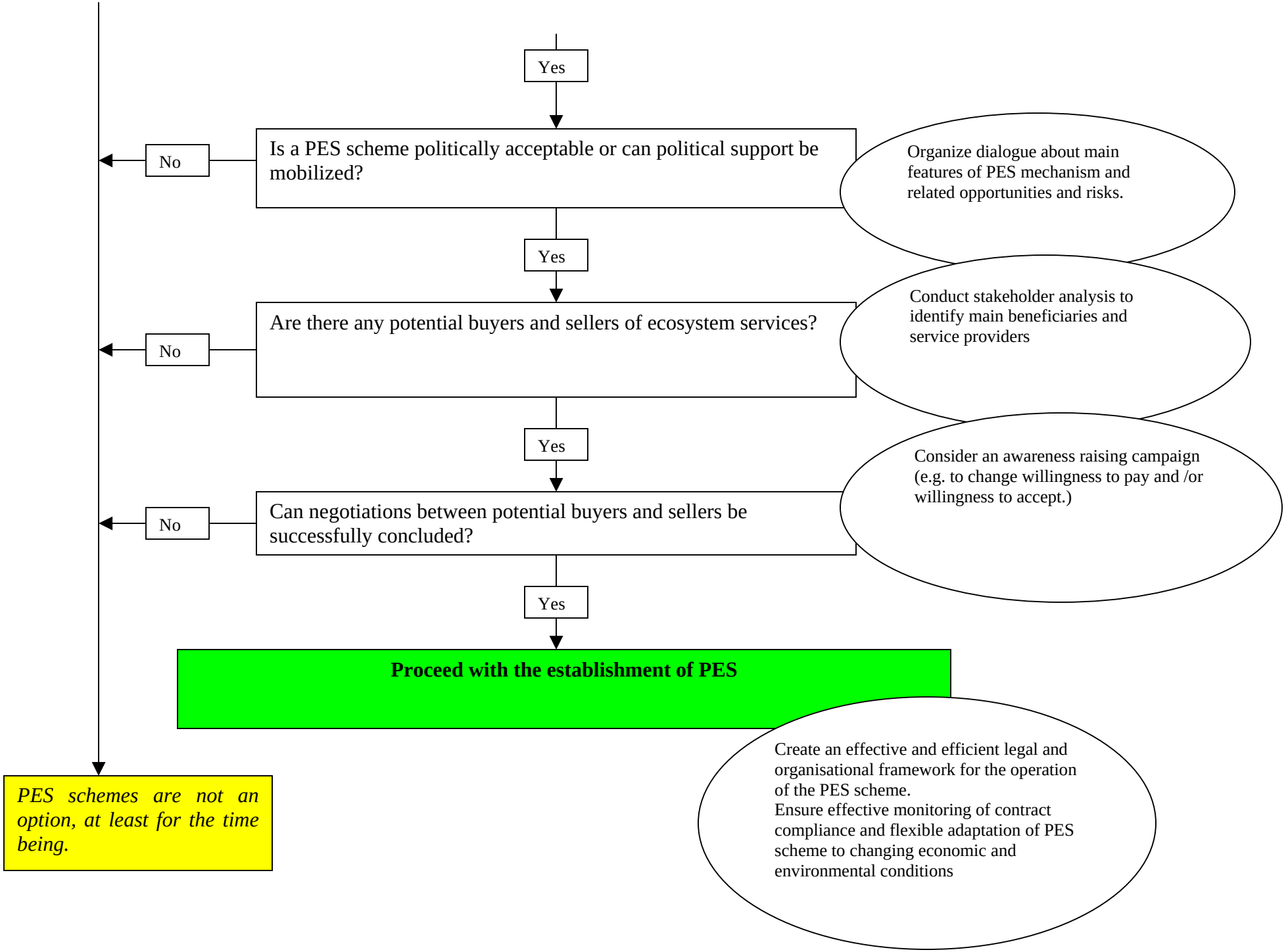
Any decision to go forward with a PES scheme will be based on an only imperfect understanding and measurement of the complex biophysical interrelationships of ecosystem processes in a river basin. This, in turn, will necessarily be reflected in a more or less large uncertainty with regard to the scale at which a given management practice or change in land use could provide the desired ecosystem service(s) and over which time horizon.

In practice, the decision making process is not linearly progressing in a single direction; thus, some issues to be dealt with at an earlier stage will re-appear at later stages (illustrated by the differently shaped text boxes in the chart) and may then have different priority ranking.

Although it is desirable that an economic analysis should be at the core of the decision-making process, in practice, lack of political acceptability or obstacles created by the policy process and legal requirements can be important constraints that may prevail over economic and/or other considerations. In any case, there are basic conditions and core principles for the establishment and operation of PES schemes (see chapter V of the main body of the Code), and these include that PES schemes must be politically acceptable and that there must be an explicit demand for a given ecosystem service.

Figure 1: Major issues in the process towards the establishment of PES




Yes
Is a PES scheme politically acceptable or can political support be mobilized?
No
Organize dialogue about main features of PES mechanism and related opportunities and risks.
Yes
Are there any potential buyers and sellers of ecosystem services?
No
Conduct stakeholder analysis to identify main beneficiaries and service providers
Yes
Can negotiations between potential buyers and sellers be successfully concluded?
No
Consider an awareness raising campaign (e.g. to change willingness to pay and /or willingness to accept.)
Yes
Proceed with the establishment of PES
Create an effective and efficient legal and organisational framework for the operation of the PES scheme.
Ensure effective monitoring of contract compliance and flexible adaptation of PES scheme to changing economic and environmental conditions
PES schemes are not an option, at least for the time being.

II. A BROAD SKETCH OF AN INTEGRATED FRAMEWORK FOR THE ANALYSIS OF THE IMPACT OF A CERTAIN PROJECT

In the following there is a broad sketch of an integrated framework for the analysis of the impact of a certain project (such as a change in land use) on the quantity, quality and value of ecosystem services and the establishment and operation of PES schemes. The focus is on water-related ecosystem services.

A. First step: Project evaluation

What is the main issue?

- Gauge the net benefits (i.e. benefits less costs) of the project and compare with the net benefits of maintaining the status quo.

What are the main requirements for this analysis?

- Identification of relevant water-related ecosystem services in the river basin;
- Identification of major stakeholders (providers, beneficiaries, local/national authorities, etc.);
- Assessment of the impact of the project on the quantity of relevant water-related ecosystem services;
- Valuation of changes in ecosystem services related to the project;
- Assessment of distributional incidence of costs and benefits on major stakeholders.

What are the main tools?

- Quantifying ecosystem services: biophysical analysis, hydrological models
- Valuation of ecosystem services: cost-benefit analysis; multi-criteria analysis; cost-effectiveness analysis; cost-utility analysis.

B. Second step: Examination of the feasibility of a PES scheme [1]

What is the main issue?

- Establishment of an effective market for water-related ecosystem services by creating a financial transfer mechanism that ensures compensation of activities, which supply these services by other activities, which demand these services.

What are the main conditions to be met?

- Quantification of the link between a conservation activity (e.g. type of land use) and the water-related ecosystem services;
- Clear definition of environmental services to be provided;
- Identification of actual/potential demand for these services;
- Willingness to pay of the actual/potential beneficiaries of these services;
- Willingness to accept of actual/potential suppliers of these services;
- Identification of potential supplementary sources of financing of the PES (including start-up and management costs) to ensure long-term sustainability of the scheme.

[1] It is assumed that the project was deemed worth carrying out.

What are the main tools?
- Biophysical analysis;
- Consultation and negotiation mechanisms;
- Cost-benefit analysis; cost-effectiveness analysis.

C. Third step: Institutionalizing the PES scheme

What is the main issue?
- Creation of an effective and efficient legal and organisational framework for the operation of the PES scheme.

What are the main requirements?
- Adaptation of framework to specific local economic, social and environmental context;
- Review and, if necessary, reform of relevant existing regulatory and fiscal provisions;
- Existence of well-defined property and tenure rights (for land use and forestry resources);
- Setting up cost-effective governance structure for financing, payment and monitoring mechanism;
- Involvement of all major stakeholders;
- Establishment of (collective) contracts between providers and buyers of ecosystem services.

What are the main tools?
- Regulatory and fiscal legislation;
- Property and tenure rights;
- Consultation and negotiation mechanisms;
- Pilot projects.

D. Fourth step: Operation of PES scheme

What is the main issue?
- Ensure effective monitoring of contract compliance and flexible adaptation of operation of PES scheme to changing economic and environmental conditions.

What are the main requirements?
- Monitoring of contract compliance (service provision, land use, payments)
- Cost effectiveness (minimize transaction costs);
- Regular review of scope for improving the effectiveness, efficiency and equity of the PES scheme.

What are the main tools?
- Adequate human, financial and technical resources;
- Capacity building (at local, national, transboundary and/or regional levels);
- Technical assistance;
- Socio-economic analysis.

Annex III

VALUATION OF WATER-RELATED ECOSYSTEM SERVICES

Valuation studies play an important role in the design and implementation of PES. They provide information on the economic value, which individuals and society place on environmental assets and changes in ecosystem services. In addition, valuation studies also help:[2]

- Assessing the overall contribution of ecosystems to social and economic well-being;
- Understanding how and why economic actors use ecosystems as they do;
- Assessing the relative impact of alternative actions so as to help decision-making;
- Making the wide range of services provided by ecosystems comparable to each other, using a common metric.

Conducting a valuation study is by no means simple, neither conceptually nor practically. However, over the past decade substantial progress has been made as regards the conceptual framework and valuation techniques for environmental cost-benefit analysis.

I. TOTAL ECONOMIC VALUE OF ECOSYSTEM SERVICES

The valuation of ecosystem goods and services is based on the concept of total economic value. In the context of this Code, the total economic value of ecosystems encompasses the value of goods and services that ecosystems generate in relation to water, both at present and in the future.

Total economic value is divided into two main categories, viz. use values and non-use values. Typically, use values involve some human 'interaction' with the ecosystem service whereas non-use values do not.

A. Use values

Use values can be broken down into direct use values, indirect use values[3] and option values.

Direct use values are derived from the actual use of ecosystem services for a given purpose. They include among others use of forests (e.g. for logging, collection of fuel wood, medicinal plants, recreation) and use of wetlands (e.g. harvesting reeds for construction and other uses, fishing). These direct uses can involve both commercial and non-commercial activities, with some of the latter often being important for the subsistence needs of rural populations in low-income regions or countries. In general, the value of services of different ecosystems in existing markets is easier to measure than the use value of services derived from transactions in non-existing markets. This may be one of the reasons why policy makers often fail to consider these non-marketed uses of ecosystems in development project decisions.

Indirect use values refers to benefits of ecosystem services that are related to the maintenance and protection of natural and human systems, including maintenance of water quality and flow, flood control and storm protection, carbon sequestration, nutrient retention and microclimate stabilization.

[2] Millennium Ecosystem Assessment, 2003, Ecosystems and Human Well-being, Island Press, Washington D.C. and http://www.millenniumassessment.org

[3] The definition of indirect use values is ambiguous. These values can often not be clearly distinguished from non-use values. A recent OECD study therefore decomposes use values only into two sub-groups: direct use values and option values. [D. Pearce et. al. Cost-Benefit Analysis and the Environment, OECD, Paris 2006, chapter 6].

O*ption values* refer to the value, which is placed on preserving an existing ecosystem service in order to maintain the option of the current generation using it in the same or different way in the future.[4] This includes also the valuation of the option of future availability of medicinal plants for drugs and pharmaceutical uses.

Bequest value refers to the willingness to pay for preserving the environment in a given state for the benefit of the next generation, for example, to make use of the ecosystem services.[5] Bequest values may be particularly high among the local populations using a wetland, reflecting a strong preference to see the wetland and their own way of life that has evolved in conjugation with it passed on to their heirs and future generations in general.

B. Non-use values

Benefits can also be derived from the conservation of ecosystem services "in their own right". This non-use or passive value is traditionally referred to as *existence value*. The existence value is reflecting the willingness to pay of individuals to ensure the continued existence of a given ecosystem.

The existence value is different from the "intrinsic" value. By definition, the latter does not depend on human preferences; therefore, economic valuation is not possible. But individual's notions of intrinsic value could nevertheless be reflected in their willingness to pay, and it is a challenge for the valuation exercise to make explicit this possible influence on the individual's valuation of the existence of the ecosystem.

II. VALUATION METHODOLOGIES [6]

A number of techniques have been developed to value the environment using information derived from existing, surrogate or hypothetical markets (see Figure 1). As regards use values, the dominant approach is the revealed preference method, but also stated preference approaches can be employed. Non-use values, however, can only be estimated by stated preference methods.

[4] Some environmental economists consider this a form of use value, as it focuses on the option to possibly use the environmental asset in the future; alternatively option values can also be treated as a non-use value, as it is uncertain whether any use will be made at all in the future.
[5] In some classifications (e.g. OECD, 2006), bequest values are placed within the category of non-use values.
[6] The following web sites provide useful technical document on the various valuation methodologies:
http://www.env-econ.net/2005/11/measuring_the_v.html
http://www.ecosystemvaluation.org/dollar_based.htm
http://www.csc.noaa.gov/coastal/economics/envvaluation.htm

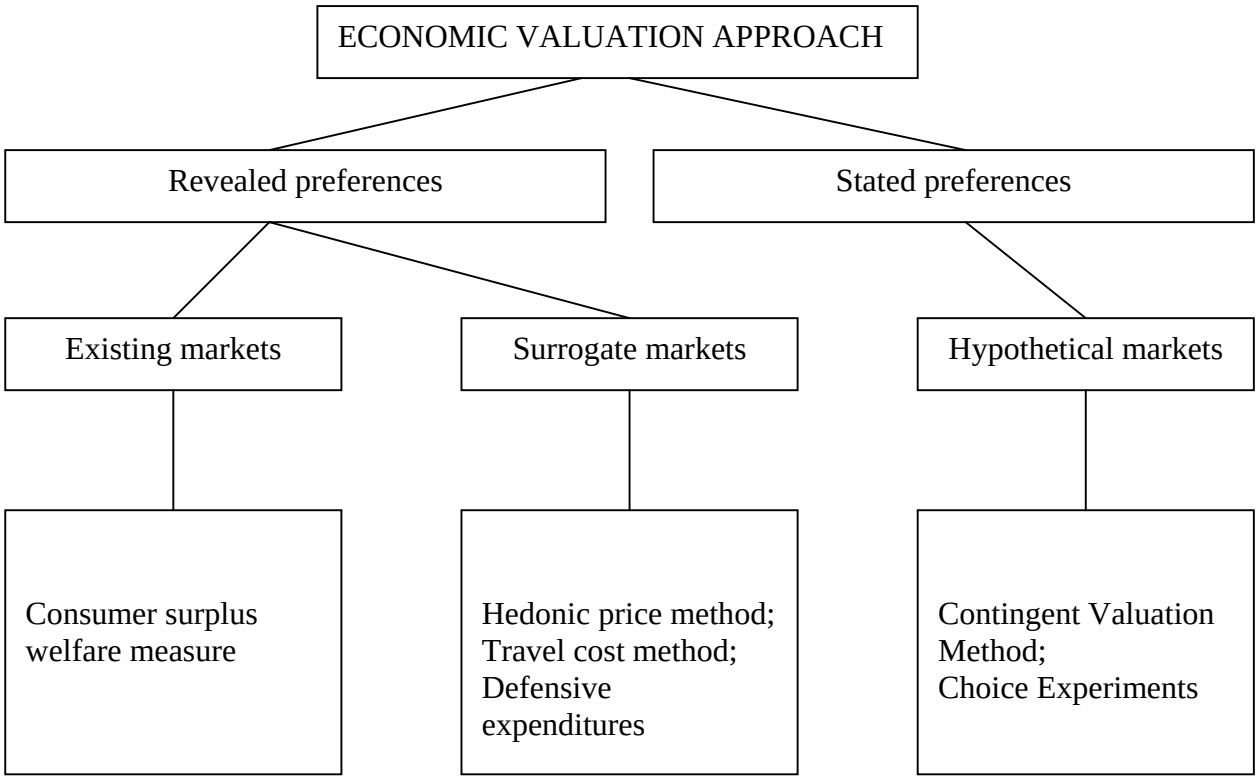


Figure 1. Approaches to economic valuation

A. Revealed preferences

Within revealed preferences, there are two major groups of techniques: the first group is using the existing markets to find the values of ecosystem services, while the second group uses surrogate markets to find the corresponding values.

Existing markets

As regards existing markets, the value of a natural resource can be monetized based on its value as a *factor input of production.* This is limited, however, to those environmental resources that are explicitly traded for use in the production process of goods and services. Because many goods and services produced by the environment are not sold in markets, the factor of production method generally fails to capture the total value of the resource to society.

The standard method used to measure the net economic benefit of a good or service that is traded in a market involves estimation of the consumer surplus. Broadly speaking, the *consumer surplus* is the cumulated difference between what each customer was willing to pay and the actual price of the good or service at the point where demand is equal to supply.

Surrogate markets

The main focus of the revealed preference methods is to estimate the value of implicitly traded non-market environmental goods and services (i.e. in surrogate markets), based on actual purchasing decisions of individuals' and households for related products. The main approaches for this are the estimation of hedonic prices, travel costs and defensive expenditures.

The *hedonic price method* aims at determining the impact that a specific qualitative environmental characteristic of a given market good has on the price of this good. The basic idea is that these qualitative characteristics are implicitly traded *via* the market good. The technique has been mainly applied to the property market in order to uncover the impact of diverse features of houses on property values, including such environmental qualities air pollution, water pollution, noise, and distance to recreational areas.

The *travel cost method* aims at valuing the use of natural areas or specific locations for recreational purposes. A good gauge to this is costs incurred by individuals for travelling to these areas, both the monetary costs and the time spent to get there.

Defensive expenditures are part of the avertive behaviour of individuals and households designed to cope with the effects of adverse environmental externalities (e.g. noise, air pollution, water quality). An estimate of these expenditures can be seen as a lower bound of the value of the benefits that would be created if the negative externality would be removed. A typical water-related example of these expenditure types are water purification devices such as filters for drinking water.

B. Stated preferences

The second group of techniques are referred to as *stated preferences methods*. These methods have to be used for the estimation of non-use values related to ecosystem services, i.e. in cases when costs and benefits of a particular ecosystem service cannot be inferred on the basis of data from existing markets. The only possibility is to use direct surveys of individuals to estimate the willingness to pay for changes in the provision of these services.

The traditional approach, the *Contingent Valuation Method*, allows gauging, on the basis of a set of specific questions, the willingness to pay (or willingness to accept payment) for a *hypothetical* change in the provision of a certain ecosystem service such as water quality.

Another survey-based approach, *Choice Experiments (or Choice Modelling)* involves the ranking, scoring and selection by individuals of a set of well-defined environmental attributes, including their monetary costs. This allows to value multidimensional changes in ecosystem services and related environmental policy options.[7]

[7] Choice experiments were applied to the assessment of water supply options for the Australian Capital Territory. The objective of the choice experiment study was to examine community preferences relating to various options for supplying water necessary to meet the demands of the area's growing population, while focusing attention on resultant environmental costs. The study examined five policy options, including damming, water recycling, and demand management, and assessed community preferences relative to (a) water availability for household use, (b) water quality, (c) cost of water to household, (d) impact on the aquatic and riparian environment, (e) maintenance of animal habitat, and (f) impact on urban environment.

III. METHODOLOGICAL FRAMEWORK FOR THE VALUATION OF ECOSYSTEM SERVICES

The context within which valuation of ecosystem services occurs, its purpose and the appropriateness of a given methodology are the key considerations when valuation studies are undertaken. Table 1 summarises the methodological framework for the valuation of ecosystem services.

Table 1: Valuation of Ecosystem Services: When, Why and How[8]

Approach	Why do we do it?	How do we do it?
Determining the total value of the current flow of benefits from an ecosystem	To understand the contribution that ecosystems make to society	Identify all mutually compatible services provided: measure the quantity of each service provided; multiply by the value of each service
Determining the net benefits of an intervention that alters ecosystem conditions	To assess whether the intervention is economically worthwhile	Measure how the quantity of each service would change as a result of the intervention, as compared to their quantity without the intervention; multiply by the marginal value of each service
Examining how the costs and benefits of an ecosystem (or an intervention, such as a change in land use or management practice) are distributed	To identify winners and losers, for ethical and practical reasons	Identify relevant stakeholder groups; determine which specific services they use and the value of those services to that group (or changes in values resulting from an intervention, such as a change in land use or management practice)
Identifying potential financing sources for conservation	To help make ecosystem conservation financially self-sustaining	Identify groups that receive large benefit flows, from which funds could be extracted using various mechanisms

[8] Adapted, based on the publication by Pagiola, S., K. von Ritter, and J.T. Bishop, 2004: How much is an ecosystem worth? Assessing the economic value of ecosystem conservation, published by IUCN, The Nature Conservancy and The World Bank
Http://biodiversityeconomics.org/document.rm?id=710

IV. CHALLENGES TO ECONOMIC VALUATION

Economic valuation studies rarely take into account the functioning state of ecosystems. Standard economic valuation methodologies derive ecosystem service values based on marginal analytic methods that assume relatively intact and stable ecosystems.[9] However, ecosystems are dynamic and stochastic[10] systems, which can shift to entirely new states of equilibrium.[11] There may therefore be a need for a periodic re-evaluation of the costs and benefits of the provision of the various ecosystem services in a river basin.[12]

Another important issue is the aggregation of individual values (preferences) to determine overall societal values (preferences). There is a risk that the values of some individuals, especially the disenfranchised, will be marginalized in the aggregation process. A considerable body of recent literature therefore favours adoption of a discourse-based approach to valuation of ecosystem services.[13]

While the methodologies for determining monetary values in case when goals are limited to economic efficiency and environmental effectiveness are comparatively well developed, there is also a need to consider issues related to distributional justice or equity, i.e. the distribution of benefits and costs among different groups of persons affected by the project.

In addition to the more fundamental concerns over the use of economic valuation methodologies, Table 2 highlights some common pitfalls to avoid when carrying out a valuation study.

Table 2: Avoiding common pitfall to valuation [14]

Advice for action	**Rationale**
Use net benefits, not gross benefits	Failing to consider the costs involved in using resources (the cost of harvesting products, for example, or the cost of piping water from its source to the user) result in an over-estimate of the value of ecosystem services.
Include opportunity costs	The costs of an action (e.g. change in land use or management practice) are not limited to the out-of pocket costs involved in implementing it. They also include the opportunity costs resulting from the foregoing benefits of alternative actions (or inaction). Omitting opportunity costs makes actions seem much more attractive than they really are.

[9] Limburg, K. E., O'Neill, R.V., Costanza, R., Farber, S., 2002. Complex systems and valuation, Ecological Economics, 41, 409 – 420

[10] See the example on modelling stochastic ecosystems in annex V.

[11] Holling, C.S. 2001. Understanding the Complexity of Economic, Ecological and Social Systems, Ecosystems, 4, 390 - 405

[12] See also the section on research needs in the main body of the code.

[13] Matthew A. Wilson, Richard B. Howarth (2002): Discourse-based valuation of ecosystem services: establishing fair outcomes through group deliberation
http://www.sciencedirect.com/science/article/B6VDY-45RFMW5-1/2/960857329a7f80cf11e25a612bdb37f6

[14] Adapted, based on the work by Pagiola, S., K. von Ritter, and J.T. Bishop, 2004 (see footnote above)

Do not use replacement costs	…unless you can demonstrate (i) that the replacement service is equivalent in quality and magnitude to the ecosystem service being valued; (ii) that the replacement is the least cost way or replacing the service; and (iii) that people would actually be willing to pay the replacement cost to obtain the service.
Do not use benefits transfer	…unless the context of the original valuation is extremely similar to the context you are interest. Even then, process with caution. However, it is a good idea to compare your results to those obtained elsewhere.
Do not use value estimates based on small changes in service availability to assess the consequences of large changes in services availability	Economic value estimates are not independent of the scale of the analysis. Value estimates are almost always made for small ('marginal') changes in service availability, and should not be used when contemplating large changes.
Be careful about double-counting	Many valuation techniques measure the same thing in different ways. For example, the value of clean water might be measured by the "avoided health care costs" or by a survey of "consumers' willingness to pay for clean water". However, the consumers' willingness to pay for clean water is due to (at least in part) their desire not to fall sick. Thus, these two results should not be added, if they were, the value of clean water would be over-estimated.
Do not include global benefits when the analysis is from a national or local perspective	More generally, only consider benefits (or costs) that affect the group from whose perspective the analysis is being undertaken. Including benefits, which are primarily global in nature in analysis undertaken from a national/local perspective is a particularly common mistake, and results in "over-estimated" benefits to the country/local area.
Adjust for price distortions	…when concluding the analysis from the perspective of society as a whole, but not when conducting the analysis from the perspective of an individual group.
Avoid spurious precision	Most estimates are by necessity approximate. Round the results appropriately, avoiding excessive precision. When there is substantial uncertainty, report the results as ranges.
Submit results to sanity checks	Are the results consistent with other results? Are they reasonable in light of the context? Extraordinarily results are not necessarily wrong, but must be checked carefully. Extraordinary results require extraordinary proof.

Annex IV

TYPES OF PES ARRANGEMENTS AND FINANCIAL ARRANGEMENTS

I. TYPES OF PES ARRANGEMENTS

A. Public schemes

Under public schemes, a public entity (e.g. a municipality, a local government, a national government) acts as the sole or primary buyer of a specified ecosystem service or, as it is more common, a related land use or management practice. These public entities also act as the administrator and executor of the PES scheme. Not only do the funds originate from public entities, they are also administered and paid out by the public entities to the service providers *cum* sellers. Typically, public schemes target water-related services to secure water supply (water-quality and water-quantity services), flood protection and erosion control, through the provision of financial compensation or incentives to land users to refrain from changing practices or stimulate to change to specific practices.

Public schemes may operate at the local or national level.

Local public schemes are PES schemes in which municipalities or local governments fund, administer and pay for ecosystem services in a specific "local" part of a basin that will yield specific water-related benefits at the local level.

National public schemes are equivalent to subsidy mechanisms of national governments. However, in the case of PES, government financial incentives are directed towards specific ecosystem services that are deemed to be beneficial not only at the local level but also at the national level. The distinguishing characteristic of national public schemes is that it concerns a PES that is sector- and nation-wide applicable. The financial incentive for the specified land use or ecosystem service is applicable to anyone who can apply/provide it, and not dependent on the locality it is offered. National public schemes thus tend to be river basin independent.

B. Private (self-organized) schemes

In private (self-organized) schemes, both buyers and sellers are private entities (companies, NGOs, farmer associations or cooperatives, private individuals). Private self-organized schemes are typically local schemes where the buyers and sellers have been able to identify an agreed ecosystem service and negotiate and settle upon an agreed price. The buyers make payments on a voluntary basis by commitment to the stipulations of the agreed contract.

The distinguishing feature of private schemes is the manner in which the PES contract and funds are administered and disbursed. In private schemes, this is typically taken care of by a specifically set up PES administration (or management) entity (either registered as an NGO or trust fund) that has been purposely set-up for the management of the PES. These PES management units administer the PES contracts with buyers and sellers; collect the funds from buyers and disburse the funds to the sellers and hold them accountable for their service provision. In practice, PES management entities may prefer to out-source the collection and disbursement of fees and monitoring to a fourth (specialised) party, usually against a service charge.

Public-private schemes, a specific sub-set of private schemes, have in principal the same features as a private scheme, except that the buyer (or one of the principal buyers) is a public utility (e.g. a municipal water-supply company or a public power utility). The feature, which distinguishes

public-private schemes form local public schemes, is the role of the participating public utilities in public-private schemes. This role is purely delimited to that of providing funds to the PES schemes in the role of a service buyer, just as any other private buyer may do. This means that the utility is not involved in the administration and management of the PES contract, as it is the case of local-public schemes, but participates as a contracting party of service buyers. In public-private schemes, the PES contract is thus administered by a third-party PES-management entity, in the same manner as in private schemes.

C. Trading schemes

Trading schemes refer to the establishment of markets on which established rights (or permits) and/or quotas can be exchanged, sold or leased. For example, environmental pollution quotas issued for nitrate, phosphorus and/or salt discharges may be sold or traded by low polluters to high polluters. Also within the realms of water management, trading schemes may be very promising mechanisms to effectively trade, bank or lease water quantities among urban/industrial, agriculture and ecosystem users/uses. A prerequisite for trading schemes to operate is that a strong, well defined and working legal and regulatory framework is in place that: (a) clearly defines the pollution quotas or water rights/permits; and (b) allows and enables the (economic) transfer, whether temporarily of permanently, of these among different users and uses, including nature or ecosystems.

II. FINANCIAL ARRANGEMENTS

A. Financial arrangements for sellers

Direct compensation

Direct compensation to sellers (i.e. ecosystem service providers) is the most frequently applied financial arrangements in PES. In most cases, compensation (or incentive) rates are set and defined for a specified land use or management practice, which is deemed to deliver the desired ecosystem service, per unit of hectare (e.g. US$/ha). A PES scheme may adopt different rates for different classes of land use or management practices that are valued to provide different degrees of ecosystem services. Alternatively, specific practices (e.g. non-application of nitrates, restrictive mowing or draining) or ecosystem indicators (e.g. number or flora and fauna species per ha, provision of habitat for specified species) may be compensated in the PES.

Investment or development funds

Alternatively, PES schemes may establish a development or trust fund, instead of issuing direct compensations to sellers. In such cases, the payments collected from the buyers are accumulated in a trust fund, which on its turn is deployed by the PES schemes in investing in ecosystem services' enhancing practices or activities. The advantage of this mechanism is that: (a) the PES funds can be deployed in a variety of ecosystem service practices and activities; and (b) it provides the flexibility to adapt investments as opportunities and needs arise. The associated disadvantage is that buyers committed to financing the trust fund do not explicitly know what type of services and benefits they will receive in return. Partly this can be overcome by buyers becoming the trustees (or members of the board) of the trust fund, through which they are granted a decision authority on deployment of the funds.

Land purchasing

Land purchasing is strictly speaking not a PES payment, but an ordinary market transaction. It is, however, frequently deployed in PES schemes as an additional, single transaction means to enhance the ecosystem services demanded. In such cases, the land acquisitions are made with the explicit purpose of enhancing the ecosystem service. Typically, converting the land use back to low-use or natural vegetation enhances such services as water retention and improving water quality. From a PES point of view, land purchasing has the advantage that it diminishes the transaction cost of otherwise required direct compensations to land owners. The disadvantage is that PES thereby becomes a competing land user that seeks to out other land uses/users; it is thereby not suitable within all socio-economic contexts.

B. Financial arrangements for buyers

The financial contributions of service buyers to the PES schemes, whether public or private, may take different forms.

Customer charged payments

Participating utilities (e.g. water supply and electricity), and to a lesser extend (beverage) industries, may charge their PES contributions directly, and explicitly, on to their customers. In general, charging an explicitly set premium price on electricity or water supply, which is used to fund the utility's PES contribution, does this. This method is frequently applied by public utilities, which usually research and/or negotiate the PES premium with their customer base.

Lump-sum contributions

Alternatively, participating buyers may contribute annual lump sums (or even one-off payments in case of trust funds). These contributions may: (a) be arbitrarily set as an outcome of negations under the PES agreement, reflecting how much buyers are willing to pay and how much is needed to acquire enough services; or (b) be set as a fraction of the turn-over or profit of participating utilities or industries.

Tax-based contributions

Public schemes may be financed through taxes. However, to qualify as a "payment" and be different from ordinary subsidies, the tax must be explicitly raised and spend for the purpose of the ecosystem service to be acquired.

Annex V

EXAMPLES OF PES SCHEMES APPLIED IN THE UNECE REGION

Chapters I to III of this annex describe PES schemes used in the UNECE region, following the recommendations of the main body of the Code, including those related to the basic conditions and core principles of establishing and operating PES. The descriptions are mostly based on an earlier study by Danièle Perrot-Maître and Patsy Davis[15] as well as information by organizations and countries.[16]

Chapter IV provides basic understanding on the establishment of PES schemes aimed at preventing and mitigating adverse impact from floods, using approaches to simulate the effects of land use changes on stochastic flood protection services from ecosystems.

I. PUBLIC PAYMENT SCHEMES

A. Public PES scheme at the local level

The New York City-Catskill watershed management programme is a striking example of a public payment scheme. The Catskill and Delaware watersheds are providing ninety percent of the water consumed by the city of New York. As the quality of water decreased in the 1990s, the United States Environmental Protection Agency (EPA) required that all surface water should be filtered, unless safe water could be provided under natural conditions. The construction of a filtration plant was estimated at US$ 6-8 billion with yearly operating costs of US$ 300-500 million. Instead of building a filtration plant, the city authorities decided to invest US$ 1.5 billion over 10 years in a watershed programme, which was to be administered by the Catskill Watershed Corporation, a non-profit organization. The programme is based on improvements in farm and forestry practices in order to reduce water pollution. The PES scheme was initiated with money from the city of New York, the State and the Federal Government. Now it is financed by a tax included in the New York water users' bills.

[15] Danièle Perrot-Maître and Patsy Davis, Esq.: Case studies of markets and innovative financial mechanisms for water services from forests, May, 2001

[16] Swiss Federal Office for the Environment; experts from Finland, Germany, Hungary, Italy, the Netherlands; the United Nations Environmental Programme (UNEP); the Food and Agriculture Organizations of the United Nations (FAO); the Ramsar Convention secretariat; the World Conservation Union (IUCN); the Liaison Unit of the Ministerial Conference on the Protection of Forests in Europe (MCPFE); and the Regional Environmental Center for Central Asia (CAREC).

Project summary	
Title of the project	New York City-Catskill watershed management programme
Type of PES	Public payment scheme (local scheme)
Significant water management problem	Microbial pathogens and phosphorus in surface water requiring special treatment by municipal water-supply company
Water-related ecosystem service	Provision of high-quality drinking water for New York City (NYC) through natural filtration rather than construction of a new filtration plant
Purpose of the project	Improvements in farm and forestry practices to significantly reduce microbial pathogens and phosphorus in the water
Supplier	Upstream forestry landowners, farmers and timber companies
Buyer	New York City (NYC) municipal water-supply company
Source of funding	Additional taxation on NYC water bills, NYC Bonds, trust funds set up and financed by NYC
Type of instruments	- Compensation to landowners (subsidies to farmers and forest landholders for any additional costs associated with the adoption of good management practices, Government provides logging companies additional logging permits in return for improvement of forest management services, property tax reduction for better land management practices); - Property transfer (Distribution of government-owned land development rights to farmers and landowners in exchange for agreements to follow good management practices, Government's purchase of conservation easements from private landowners that require retirement of certain ecologically significant land from production, purchase of hydrologically sensitive land); - Development of markets (new markets for non-timber products, timber product certification)

Amount of payment	Dairy farms and foresters, who adopted good management practices, were compensated with US$40 million, which vowed their additional costs. Foresters, who improved their management practices (such as low impact logging) received additional logging permits for new areas, and forest landowners owning 50 acres or more and agreeing to commit to a ten-year forest management plan were entitled to an 80% reduction in local property tax.
Laws/regulations	A number of Federal, state and local regulatory changes were necessary to implement the Programme, including: (a) the US Environment Protection Agency's agreement to waive the filtration requirement provided time to develop a cost-effective alternative to achieving water quality, (b) a ten-year permit from the State Department of Environmental Conservation to enable the NYC to acquire land, and (c) the revision of the long-standing New York State Watershed Rules and Regulations with the aim of establishing new standards for water facilities and construction projects and requiring City review and approval of activities having potentially adverse effects on water quality.
Role of the public sector	Though NYC led the project, both the Federal and state governments also provide financial and technical assistance. The US Department of Agriculture provides technical assistance and financial incentives to farmers under its Farm Bill Conservation Program. The New York State grants financial help to the Conservation Enhancement Program and the State Department of Conservation conducts water-quality research and nutrient monitoring.
Equity concerns	Farmers decided to participate in the programme because of their concern that they might be put out of business due to stringent command-and-control measures. Many farmers had lost land when the New York City reservoirs were built and they were not willing to risk losing more land. Landowners who owned small areas of forests were concerned because the 80% local property tax reduction would only benefit those forest landowners with 50 acres or more.
Lessons learned for designing similar systems	The approach used by NYC was cost-effective and politically acceptable as the cost of the programme were lower than the cost of the additional filtration plant, and the water users were willing to be taxed to support the cost of the programme. The approach may not be applicable for catchment areas that are more commercially and industrially developed and more densely populated than in the Catskill/Delaware area. [17]

[17] This was the case of the Groton catchment, which also supplies water to NYC. In this case, the City invested in a new filtration plant because the high population density and the level of development in the area precluded using any approach centered on the protection/enhancement of ecosystem services.

B. Public PES schemes at the national level

In Switzerland, precipitation generates drinking water to the value of about € 3,500 per hectare of agricultural land. As intensive farming, not adapted to the local conditions, is the main cause of groundwater nitrate pollution, further measures had to be taken in addition to a strong legislation on water protection and agriculture; these include voluntary programmes promoting extensification.

The objective of the PES scheme was to change management practice in order to decrease the nitrate pollution in groundwater, with priority to groundwater used for drinking-water supply. As stipulated by the Federal Water Protection Ordinance of 28 October 1998, authorities are required to initiate measures, if the maximum level of 25 mg NO_3/l is exceeded in groundwater used for drinking water or intended as such. Based on article 62 (a) of the Federal Law on the Protection of Waters, farmers taking part in a coordinated nitrate-reduction project within the area of contribution of a contaminated drinking-water well are compensated for the additional costs following contractually fixed water protection measures, which go beyond legal requirements and good agricultural practice, and which are sufficient to lower the nitrate concentration below 25 mg/l (see below). The Federal State establishes the conditions for compensation, while the Cantons enforce the relevant measures (contracts with farmers, payments and control/evaluation).

Compensation can be given in case of restrictions of exploitation, in case of new/required investments or disinvestments, including income reduction due to the change of agricultural practice, provided the measures go beyond legal requirements and good agricultural practice. Financial support is allocated by a contract and a one-time payment per year during a maximum of 6 years, after which the project is evaluated and required follow-up activities/funding are examined.

Project summary	
Title of the project	Nitrate strategy of Switzerland
Type of PES	Public payment scheme (national scheme)
Significant water management problem	Pollution of groundwater aquifers with nitrates with priority focus on groundwater used for drinking-water supply
Water-related ecosystem service	Reduction of nitrate charges in groundwater and consequently of nitrate input into the North Sea via the river Rhine; provision of high-quality drinking water
Purpose of project	Change of management practice in agriculture beyond legal requirements and good agricultural practice
Supplier	Farmers
Buyer	Federal government, Cantons and water supplier

Type of instruments	Compensation for contractually fixed changes in agricultural practice beyond legal requirements and good agricultural practice
Source of funding	Federal government, Cantons and water supplier
Amount of payment	Between € 130 per hectare and year for measures in open cultures and up to € 1'250 for enhancing the meadows surface
Laws/regulations	Federal Law on the Protection of Water, Water Protection Ordinance and Federal Law on Agriculture The Federal State establishes the conditions for compensation, while the Cantons enforce the relevant measures (contracts with farmers, payments and control/evaluation).
Role of the public sector	Launching an information campaign "ActionN - Fewer Nitrates in Water", contacting all relevant institutions, holding farmers' lobbies, issuing newsletters and creation of a website (www.nitrat.ch)
Equity concerns	Apply to farmers that are located within the area of contribution of a contaminated drinking-water well who need to take water protection measures, which go beyond legal requirements and good agricultural practice
Lessons learned for designing similar systems	At present, some 20 "local" projects are under way in a number of Swiss Cantons for a total of 3,000 hectares of agricultural land. Similar projects could be carried out in Switzerland for a total of estimated 50,000 hectares. More projects are in preparation.

C. Public PES schemes at a sub-regional level

The EU Common Agricultural Policy and agri-environmental measures (AEMs) are incentives to encourage farmers to protect and enhance the environment on their farmland. Farmers are paid in return for a service. They sign a contract with an official institution (administration) and are paid for the additional cost of implementing such commitments and for loss of income due, for example, to reduced production. The two main objectives are to reduce environmental risks and preserve nature and cultivated landscapes. AEMs go beyond usual Good Farming Practice (legal obligations and levels of environmental care that each farmer has to comply with anyway, compiled in "regional" codes submitted by Member States to the Commission for approval).

Some AEMs concern productive land management, such as input reduction (reduction of fertilizers and plant protection products, crop rotation measures, organic farming, extensification of livestock, conversion of arable land to grassland, under-sowing, cover crops, farmed buffer strips, prevention of erosion and fire and rotation measures, conversion of arable land, actions in areas of special biodiversity/nature interest such as late mowing) genetic diversity, maintenance of existing sustainable and extensive systems, farmed landscape and water use reduction measures. Other

AEMs concern non-productive land management, such as setting aside, upkeep of abandoned farmland and woodland, upkeep and maintenance of the countryside and landscape features.

Project summary	
Title of the project	Agri-environmental measures to encourage farmers to protect and enhance the environment on their farmland.
Type of PES	Public payment scheme (sub-regional application for EU member countries)
Significant water management problem	Water pollution by fertilizers and pesticides
Water-related ecosystem service	Improving the quality of surface waters and groundwaters
Purpose of the project	Change of management practice in agriculture
Supplier	Farmers
Buyer	Government authorities
Type of instruments	Compensation payment; Annual grants to compensate for the loss of income due to change of land-use (e.g. Denmark, Germany, Greece, Italy and Spain).
Source of funding	EU taxpayers
Amount of payment	Following the 2003 mid-term assessment of AEMs, the average agri-environmental payment was € 89 per hectare and year (from € 30 to 240), and € 186 per hectare and year for organic farming (from € 40 to 440). Apart from the above-mentioned payments, compensatory allowances are given in Less Favoured Areas (LFAs) and areas with environmental restrictions (vulnerable environments or areas with a high ecological value). Such areas include mountain areas or areas where the soil or climate limits the production. The 2003 mid-term assessment of AEMs showed that the average annual compensatory allowances for LFAs amounted to € 2,319 per holding and € 71 per hectare.
Laws/regulations	EU water-related legislation, such as the Nitrates Directive[18] and the Water Framework Directive[19], EU Common Agricultural Policy and agri-environmental measures

[18] Council Directive of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (91/676/EEC), http://europa.eu.int/eur-lex/en/consleg/main/1991/en_1991L0676_index.html

Lessons learned for designing similar systems	The 2003 mid-term assessment of AEMs showed that these measures improved soil and water quality although it was difficult to quantify all benefits. In their rural development programmes 2000-2006, EU country profiles list agri-environmental measures among their main priorities; examples include Germany, Italy, the Netherlands, Spain and the United Kingdom. The enthusiasm for AEMs varies among regions within a country. It depends, inter alia, on the structure of the farm, its size, the age of owners, and their level of skills.

II. SELF-ORGANIZED PRIVATE DEALS

An example of a self-organized private deal is given by Nestlé waters' practice in France. Nestlé, which owns the natural mineral water sources of Vittel in North-Eastern France, protected the spring catchment area, which was intensively farmed (nutrient run-off and pesticides), by purchasing agricultural land and reforesting it. It also reduced further non-point pollution by passing 18-30 years contracts with the local farmers to reduce nitrate pollution by adopting extensive and optimal cattle ranching practices and replace corn production with alfalfa. The yearly payments are based on the opportunity cost and actual costs of technological change.

Project summary	
Title of the project	Vittel's S.A. payments for water quality
Type of PES	Self-organized private deal
Significant water management problem	Nutrient run-off and pesticides
Water-related ecosystem service	Provision of high-quality mineral drinking water
Type of project	Change of management practice
Supplier	Dairy farmers
Buyer	Nestlé Waters, which owns the natural mineral water sources of Vittel S.A. in North-Eastern France
Funding source	Vittel financed all compensation payments and costs of technological and land use change. The French Government financed research to identify alternative land management scenarios

[19] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, http://europa.eu.int/eur-lex/pri/en/oj/dat/2000/l_327/l_32720001222en00010072.pdf

Type of instruments	Property acquisition; Compensation for changing management practice
Amount of payment	Vittel financed investment costs and paid US$ 230 per hectare and per year for a period of 7 years to cover the reduced profitability.
Laws/regulations	The scheme was possible because existing French water legislation provided the suitable regulatory framework and provided also the right framework to enforce contracts.
Role of the public sector	Though no formal partnership was established between the private and public sector, the public sector had a fundamental role in implementing the regulatory framework, assure the enforceability of contracts and granting some limited financial aid.
Equity concerns	Equity was respected as farms of all sizes had access to the PES. All farmland in the sub-catchment are enrolled into the programme.
Lessons learned for designing similar systems	When Vittel purchased Perrier and Contrexeville, it "exported" the approach to these companies, considering (a) that the conditions at the Contrexeville Springs were similar to those of the Vittel Springs; and (b) that the Perrier springs were located in an area of vineyards and intensive wheat cultivation. The scheme is feasible because of the limited number of farms and the high profitability of the business.

III. TRADING SCHEMES

In many rivers in the United States, increasingly high nutrient loads have had a significant adverse impact on water quality. Government regulations have traditionally tried to control water quality by establishing fixed standards for quality and/or fixed levels of allowable discharge for particular pollutants from particular point source polluters. Point-source polluters are those, who discharge nutrients from a precisely localized source - often an industrial site or municipal sewage plant. To meet the regulatory standards for water quality, point polluters often have had to invest in expensive waste-reduction technology.

Legally set allowances for "discharges from non-point sources", such as fertilizer run-off from agricultural fields, have not been fixed. This is mainly due to the difficulty of measuring or estimating the pollution from by non-point sources, which depends on such factors as the pathway of the pollution, the kind of polluting substances, vegetation growth and hydrometeorological conditions.

As an alternative to regulation, nutrient trading has been instituted in several catchment areas in the United States as a flexible, cost-effective and equitable way to comply with water-quality standards and to give non-point sources a financial incentive to participate in pollution control.

Project summary	
Title of the project	United States nutrient trading
Type of PES	Trading scheme
Significant water management problem	High nutrient loads in surface waters
Water-related ecosystem service	Improved water quality
Type of the project	Nutrient trading to comply with water-quality standards and to give non-point sources a financial incentive to participate in pollution control
Supplier	Point source polluters discharging below allowable levels and non-point unregulated sources reducing their pollution through, for example, adopting ecologically sound agricultural practices.
Buyer	Polluting sources with discharges above allowable level
Sources of funding	The credit buyers, although the State finances transaction costs required for the implementation of the scheme
Type of instruments	Trading of nutrient reduction credits among industrial and agricultural polluting sources or among non-point sources (e.g. agriculture)
Amount of payment	Costs for trading appear to be higher than expected. Transaction costs associated with the design of trading mechanisms (regulatory framework, information gathering, identification of potential traders) and administrative costs (water-quality monitoring) may be higher than those associated with traditional ways of treating water. For example, in south central Minnesota the cost of running a trading program was estimated at US$12 to 15 per pound of expected phosphorus load reduction. This amount was about two or three times the estimated unit cost of phosphorus removal from municipal water treatment systems. In fact, when incentive payments (US$5 to 10 per acre) were included, the cost rose to US$48 to 70 per pound. This amount did not include (a) transaction and enforcement costs and (b) the costs of an educational programme to encourage landowners' participation.

Laws/regulations	A strong regulatory framework is a prerequisite for trading. A monitoring system, standards and trading rules must be established to ensure that credits traded are really associated with ecological improvements. A legal remedy must be available to assure that a credit traded by a polluter corresponds to a true reduction in nutrient discharge.
Role of the public sector	Although the exchange is between private entities, the public sector plays an essential role. Trading both requires strong regulations and sufficient financial resources to cover the associated high design and transaction costs; these resources usually come from the public sector.
Equity concerns	A trading scheme transfers the burden of management and transaction costs from regulatory authorities to polluting sources (can be point sources or non-point sources). Since industry bears most of the burden while the agricultural sector is the main contributor to the nutrient problem, it would arguably be more equitable to treat and control agriculture as “a point source” and link the provision of agricultural subsidies to ecological improvement. The main reason for establishing trading scheme is that one beliefs that it would be generally more cost efficient and more effective than command-and-control measures. The approach takes into account the different cost structure of the polluters and give them the choice to reduce their pollution by changing their production technology or to pay those, who reduce their pollution level below recommended levels so that the level of water quality requested by law is reached.
Lessons learned for designing similar systems	Point source/non-point source trading programmes have been used in the United States for the Dillon and Cherry Creek Reservoirs, which provide about half of the City of Denver’s water supply, and in the North Carolina’s Tar-Pamlico catchment area. The feasibility of such trading appears to be limited to highly site-specific circumstances. The use of water-quality trading schemes has so far been limited to highly developed countries.

IV. ESTABLISHMENT OF PES SCHEMES BASED ON SIMULATION OF LAND USE CHANGES TO ASSESS AND VALUATE STOCHASTIC FLOOD PROTECTION SERVICES FROM ECOSYSTEMS

A. Simulation models

Flood protection is an important service that different ecosystems – forests and wetlands in particular – do provide within a given basin. These flood protection services are stochastic services as they have an impact onto the probability of flood events.[20]

Such flood protection services of ecosystems can be assessed and valuated by means of an interlocking system of hydrologic-hydraulic and economic computer simulation models illustrated in figure 1.

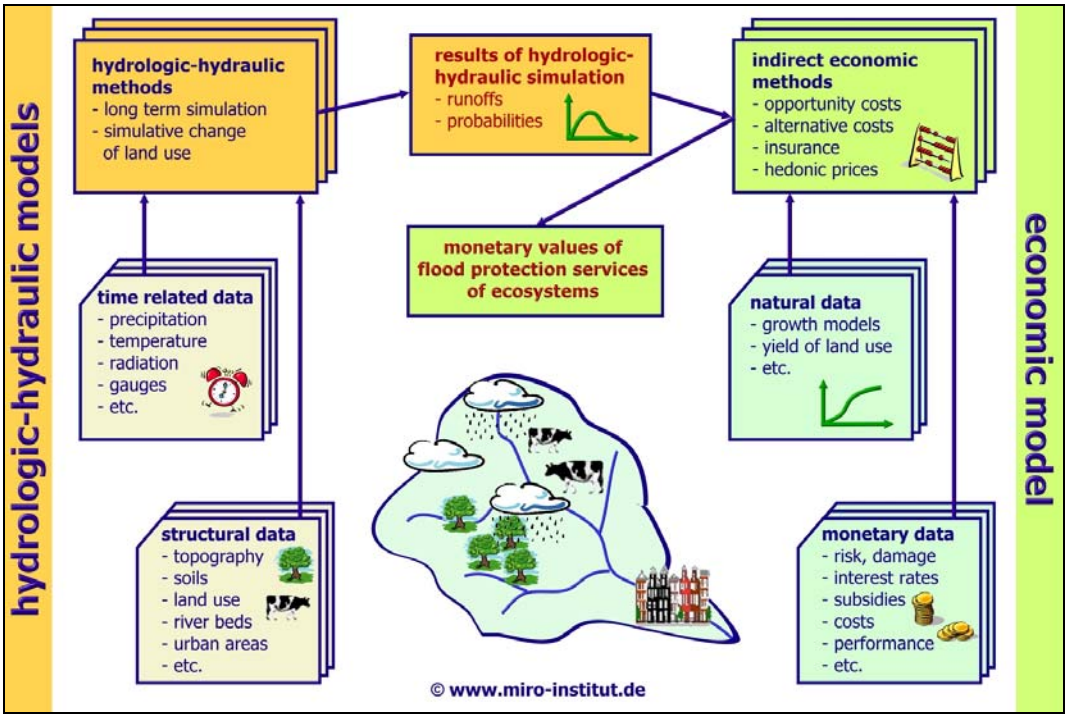


Figure 1. Interlocking system of hydrologic-hydraulic and economic models for monetary valuation of flood protection services of ecosystems

In order to quantify the probability of flood events, a two-step approach is necessary. First, the probability of flood events under a given pattern of land use needs to be calculated by means of hydrologic-hydraulic models (long-term simulation). In a second step, the impact of changing the particular pattern of land use on the probability of runoff within the basin needs to be simulated.

The hydrologic-hydraulic models that use numerous time-related data, such as climate variables and structural data on land use, soils and topography, need to be calibrated by comparing calculated runoff with runoff measured at river gauges.

[20] Ecosystems providing flood protection services have a measurable impact on the probability of flood events in downstream parts of the basin. They have an influence on the quantity of runoff and the recurrence interval of different runoff events; for example, a flood event expected every 50 years or every 100 years.

The simulation of land use changes provides a powerful tool to estimate the biophysical impact of different types of land use, such as forests and wetlands, on the probability of runoff in the given basin.

In a subsequent step, the monetary values of the flood protection service can be calculated in order to establish a PES system. The economic model, capable of applying different methods (see figure 1 and annex III), provides important information to upstream sellers and downstream buyers.

To achieve economic efficiency, it is most important to reduce transaction costs. It is recommended that sellers and buyers in a given basin establish "flood protection clubs" comprising groups of upstream farmers and groups of downstream settlers, which eases the negotiations on prices and contracts considerably.

B. Application in a catchment area in Germany

The interlocking system of hydrologic-hydraulic and economic models, described above, was developed for the basin of the river Vicht, located in the Eiffel Mountains in the western part of Germany adjacent to Belgium. The main types of land use in the catchment area of 104 km^2 were forests (55%) and grassland (31%); 8% of the catchment area was paved.[21]

The long-term simulation of precipitation-runoff events under the given pattern of land use with properly calibrated hydrologic-hydraulic computer simulation models showed close correlation with runoff measured at river gauges. The effects of changing land use on the probability of runoff were also simulated.

To give an idea of the vast capabilities of such models, it is possible to calculate how many hectares of grassland at different locations within the catchment need to be converted into forests in order to compensate for the additional runoff generated from paving one hectare of grassland. The economic values of such changes of land use can be calculated by means of opportunity costs that indicate how much income from dairy farming a farmer in the region loses by converting grassland into forests.

Lessons learned for designing similar systems are as follows:

- Simulating precipitation-runoff-events and changes of land use is powerful tool and can be applied in any basin. It provides valuable information and contributes to the improvement of political decisions on land use within the basin;
- The stochastic ecosystem service of flood protection varies strongly from basin to basin and within the same basin depending on both biophysical and economic data. Thus, the results calculated for one basin cannot be transferred to another basin;
- Land owners giving up farming have opportunity costs, which need to be compensated in order to decide planting trees to provide flood protection services;
- The establishment of flood protection clubs of upstream farmers and downstream settlers could be a feasible instrument to make payment systems for ecosystem services work without high transaction costs if the institutional framework is put up by the Government;
- Pilot studies in mountainous areas with high rainfall should be carried out in order to locate effective areas for establishing flood protection forests and test the instrument of flood protection clubs.

[21] See: Grottker Thomas, 1999. Erfassung und Bewertung regionaler Hochwasserschutzleistungen von Wäldern – dargestellt am Beispiel des Wassereinzugsgebietes der Vicht. Schriften zur Forstökonomie, Bd. 19, Sauerländer's Verlag, Frankfurt.

Annex VI

RECENT DECISIONS OF HIGH-LEVEL MEETINGS IN SUPPORT OF PES

The annex provides a brief summary of recent decisions by UN member States and, if applicable, the European Community, at high-level meetings supporting PES. For easy reference, relevant text passages are emphasized in bold-italics.

I. FOURTH MINISTERIAL CONFERENCE ON THE PROTECTION OF FORESTS IN EUROPE

(Vienna, Austria, 28-30 April 2003) [22]

In the Vienna resolution 2 on "Enhancing Economic Viability of Sustainable Forest Management in Europe", the Signatories States and the European Community recognize "*…that forests provide a broad range of social, cultural and environmental values to society, striving to improve the economic viability of sustainable forest management through income generated from marketable goods and services as well as, where appropriate, from revenues from currently non-marketed values*… [paragraph 4]"

With this resolution, the Signatories States and the European Community committed themselves to:

- "…improve enabling conditions for ***the market-based provision of a diversified range of non-wood goods and services from sustainably managed forests***, inter alia, through identifying and removing unintended impediments and setting appropriate incentives" [paragraph 9];

- "…work towards common approaches to the ***practical application of the valuation of the full range of goods and services*** provided by forests and contribute to existing information systems, in co-operation with relevant organizations; incorporate the outcome of these valuations in relevant policies and programmes" [paragraph 10];

- *"…promote the use of innovative economic instruments* for achieving forest related goals and targets" [paragraph 17].

II. STATEMENT OF THE MINISTERIAL MEETING ON FORESTS

(Rome, Italy, 14 March 2005) [23]

The Ministers responsible for forests, meeting in Rome on 14 March 2005 at the Ministerial Meeting on Forests to consider international cooperation on sustainable forest management including on forest fires, called on "….FAO to further develop studies and assist countries, upon request, in the design and implementation of ***projects on payment for environmental services from forests*** as well as in the assessment of the various benefits (water, carbon, biodiversity) of these projects…".

[22] http://www.mcpfe.org/mcpfe/resolutions/vienna/Vienna_Resolution_2.pdf
[23] http://www.fao.org/forestry/foris/webview/forestry2/index.jsp?siteId=6201&sitetreeId=26480&langId=1&geoId=0

III. UNITED NATIONS COMMISSION ON SUSTAINABLE DEVELOPMENT, THIRTEENTH SESSION ON WATER, SANITATION AND HUMAN SETTLEMENTS

(New York, USA, 30 April 2004 and 11-22 April 2005)

Resolution 13/1 on policy options and practical measures to expedite implementation in water, sanitation and human settlements in its paragraph 3 "…calls upon Governments, and the United Nations system, within existing resources and through voluntary contributions, and invites international financial institutions and other international organizations, as appropriate, working in partnership with major groups and other stakeholders, to take action as follows: …concerning the means of implementation, mobilize adequate resources to meet the water, sanitation and human settlements goals and targets, tapping both domestic and international sources through a range of financing approaches, such as [paragraph x]:…***Enhancing the sustainability of ecosystems that provide essential resources and services for human well-being and economic activity and developing innovative means of financing for their protection*** [paragraph x, sub-paragraph (iii)].[24]

IV. NINTH MEETING OF THE CONFERENCE OF THE CONTRACTING PARTIES TO THE CONVENTION ON WETLANDS [25]

(Kampala, Uganda, 8-15 November 2005)

A. Resolution IX.3: Engagement of the Ramsar Convention on Wetlands in ongoing multilateral processes dealing with water

In paragraph 20, the Conference of the Contracting Parties, " INSTRUCTS the Ramsar Secretariat to promote and implement, with Contracting Parties, relevant and key elements of the decision taken at CSD13 on Integrated Water Resources Management, including inter alia enhancing the sustainability of ecosystems that provide essential resources and benefits/services for human well-being and economic activity and ***developing innovative means of financing their protection; protecting and rehabilitating catchment areas*** for regulating water flows and improving water quality, taking into account the critical role of ecosystems; and supporting more effective water demand and water resource management across all sectors, especially in the agricultural sector; and ALSO INSTRUCTS the Secretariat to report to the 34th meeting of the Standing Committee on an action plan for the Convention in promoting these themes in order for the Standing Committee through the Secretary General to provide input to the CSD report-back session in 2008".

B. Resolution IX.14: Wetlands and poverty reduction

In paragraph 8, the Conference of the Contracting Parties, "FURTHER URGES all Contracting Parties, bearing in mind the examples outlined in Ramsar COP9 DOC. 33, to take or support action to….review and improve existing financing mechanisms and encourage new thinking in finance institutions, such as the Global Environment Facility, for wetland management to help address poverty reduction, and ***new ideas such as local agreements with wetland communities to enable the maintenance of ecosystem benefits/services***.

In paragraph 10, the Conference of the Contracting Parties, "ENCOURAGES Parties to work with the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP), the UN Department of Social and Economic Affairs, the Ramsar International

[24] See E/2005/29-E/CN.17/2005/12

[25] http://www.ramsar.org/res/key_res_ix_index_e.htm

Organization Partners, national and international NGOs and others to…***undertake assessments of the economic, social, cultural and livelihood values of individual wetlands and wetlands in general and the benefits/services they deliver***, with a view to enhancing sustainable livelihoods utilizing a wise use approach.

V. INTERNATIONAL TROPICAL TIMBER AGREEMENT [26]

(Geneva, 27 January 2006)

In the Preamble, the Parties to the agreement recognize, inter alia ….the ***"importance of the multiple economic, environmental and social benefits provided by forests, including timber and non-timber forest products and environmental services***, in the context of sustainable forest management, at local, national and global levels and the contribution of sustainable forest management to sustainable development and poverty alleviation and the achievement of internationally agreed development goals, including those contained in the Millennium Declaration" [preamble, paragraph f]

Article 1 states that the objectives of the agreements "…are to promote the expansion and diversification of international trade in tropical timber from sustainably managed and legally harvested forests and to promote the sustainable management of tropical timber producing forests by …."***promoting better understanding of the contribution of non-timber forest products and environmental services*** to the sustainable management of tropical forests with the aim of enhancing the capacity of members ***to develop strategies to strengthen such contributions in the context of sustainable forest management***, and cooperating with relevant institutions and processes to this end" (art. 1, paragraph q).

VI. SIXTH SESSION OF THE UNITED NATIONS FORUM ON FORESTS [27]

(27 May 2005 and 13 to 24 February 2006)

The 6th session of the United Nations Forum on Forests prepared a draft resolution for adoption by ECOSOC on the outcome of its session. This draft resolution suggests, inter alia…"(k) ***Further developing innovative financial mechanisms for generating revenue to support sustainable forest management"*** and "(l) ***Encouraging the development of mechanisms which may include systems for attributing proper value, as appropriate, to the benefits derived from goods and services*** provided by forests and trees outside forests, consistent with relevant national legislation and policies.

VII. EIGHTH ORDINARY MEETING OF THE CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY [28]

(Curitiba, Brazil, 20 - 31 March 2006)

A. Decision VIII/9: Implications of the findings of the Millennium Ecosystem Assessment

In paragraph 19, the Conference of the Parties states: "Aware also of the need to improve knowledge of trends in biodiversity, and understanding of its value, including its role in the provision of ecosystem services, as a means of improving decision-making at global, regional, national and local levels, and also recognizing cross-scale interactions in ecosystems, *urges* Parties,

[26] http://www.unctad.org/en/docs/tdtimber3d12_en.pdf

[27] United Nations Forum on Forests, Report of the sixth session (27 May 2005 and 13 to 24 February 2006), E/2006/42-E/CN.18/2006/18, advanced unedited version, Economic and Social Council, Official Records, 2006, Supplement No. 22, available at http://www.un.org/esa/forests/pdf/session_documents/unff6/unff6-advanced-report.pdf

[28] http://www.biodiv.org/decisions/default.aspx?m=COP-08&id=11023&lg=0

other Governments and relevant organizations, including scientific bodies, to increase support for and coordinate research, inter alia, to improve: basic knowledge and understanding of biodiversity and its components; monitoring systems; measures of biodiversity; ***biodiversity valuation***; models of change in biodiversity, ecosystem functioning and ecosystem services; and understanding of thresholds."

In paragraph 21, the Conference of the Parties "requests the Subsidiary Body on Scientific, Technical and Technological Advice to take note in its deliberations of the linkages between biodiversity and relevant socio-economic issues and analysis, including economic drivers of biodiversity change, ***valuation of biodiversity and its components***, and of the ecosystem services provided, as well as biodiversity's role in poverty alleviation and achieving the Millennium Development Goals.

B. Decision VIII/17: Private-sector engagement

In this decision, the Conference of the Parties notes, inter alia…." that contributions from business and industry towards the implementation of the Convention and its 2010 target could be facilitated by further work under the Convention to develop …(b) tools for assessing the ***value of biodiversity and ecosystem services, for their integration into decision-making.***

C. Other decisions

Two other decisions are in their entirety important regarding the establishment and operation of PES. These are Decision VIII/25 (Incentive measures: application of tools for valuation of biodiversity and biodiversity resources and functions) and Decision VIII/26 (Incentive measures: preparation for the in-depth review of the programme of work on incentive measures).