



Congress: "Vulnerability of the Mediterranean soils to water erosion: State of knowledge and adaptation strategies in the face of global change"
Rabat, 19-20 November 2018

Payments for Water Services: potentials and constraints

Davide Pettenella, Laura Secco and Mauro Masiero

TESAF Department
University of Padova (Italy)

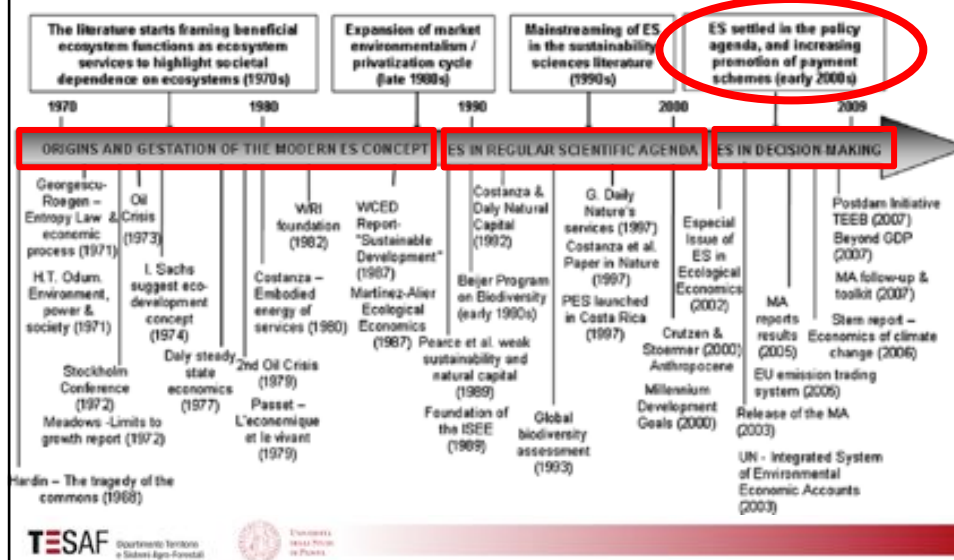
TESAF

Dipartimento Territorio
e Sistemi Agro-Forestali



Università
 degli Studi
 di Padova

Stages in the modern history of ecosystem services (Gómez-Baggethun *et al.*, 2010)



TESAF

Dipartimento Territorio
e Sistemi Agro-Forestali



Università
 degli Studi
 di Padova

A long list of policy statement

- **4th Ministerial Conference on the Protection of Forests in Europe** (Vienna, Austria, 28–30 April 2003)
- **Statement of the Ministerial Meeting on forests** (Rome, Italy, 14 March 2005)
- **UN Commission on Sustainable Development, 13th Session on water, sanitation and human settlements** (New York, 30 April 2004 and 11–22 April 2005)
- **9th Meeting of the conference of the contracting parties to the convention on wetlands** (Kampala, Uganda, 8–15 November 2005)
- **Resolution IX.3: Engagement of the Ramsar Convention on Wetlands in ongoing multilateral processes dealing with water**
- **International Tropical Timber Agreement** (Geneva, Switzerland, 27 January 2006)

TESAF

Departamento Territorio
e Saneamiento Ambiental



Ministério do Meio Ambiente
do Estado de São Paulo

- **6th SESSION**
- (27 May 2005)
- **8th ORDINARY MEETING OF THE PARTIES** (Curitiba, Brazil)

Food and Agriculture
Organization of the
United Nations

UNECE

Forests and Water

valuation and payments for forest ecosystem services



UNITED NATIONS

FORESTS

THE

Forum
FOREST

s for
mental
es:
ard
nean

European Parliament, Brussels,
Brussels, 14-15 June 2005

(PES)
U Forest Strategy
the
forests
try, etc)
th MEPs
E
FOREST INSTITUTE

Just published

TESAF

Departamento Territorio
e Saneamento Ambiental



UNITED NATIONS



ES markets at global scale



Markets for ES: global view

Source: Ecosystem Marketplace, 2017



ES markets in Europe



Markets for ES: Europe

Source: Etifor & Ecosystem Marketplace, 2017



Outline

- The drivers: the need for new tools in (water related) policies
- Some case studies
- Barriers and challenges for PES development
- Final remarks

Outline

- **The drivers: the need for new tools in (water related) policies**
- Some case studies
- Barriers and challenges for PES development
- Final remarks

Policy instruments to ensure provision of ecosystem services (mod. from OECD, 2006)

Sticks

= Command and Control

- Prohibition bans
- Licenses/Permits
- Compulsory Standards (e.g. environmental,

A "light" State

Direct involvement of private stkhlds

Solutions more tailored to the real problems

Carrots

= Incentives

Market-based
instruments (MBIs)

- Payments for environmental services (PES) and PES-like
- Direct markets
- Tradable permits
- Auctions
- Ecolabeling/Certification...

Sermons

= Information

- Awareness campaigns
- Extension services
- Information disclosure
- Research and development...

TESAF

Departamento Territorio
e Suelos Agro-Forestal



Universidad
de Pinar del Rio

Policy instruments to ensure the provision of ecosystem services (mod. from OECD, 2006 and Wunder, 2006)



TESAF

Departamento Territorio
e Suelos Agro-Forestal



Universidad
de Pinar del Rio

PES: definition

No official definition, but many un-official definitions over time: Wunder (2005 and 2015), Tacconi (2012), Sommerville *et al.* (2009), Porras *et al.* (2008, 2012), van Noordwijk *et al.* (2007), Swallow *et al.* (2009), Shelley (2011), Karsenty (2011), Muradian *et al.* (2010), Engel (2015)...

A PES is... (Wunder, 2005):

1. a **voluntary transaction** in which
2. a **well defined ES** (or a land use likely to secure that service)
3. is **“bought”** by a (minimum of one) **buyer**
4. from a (minimum of one) **provider**
5. if and only if the provider continuously secures the provision of the service (**conditionality**)

A “classic” example Vittel Mineral Water (Vosges, France)

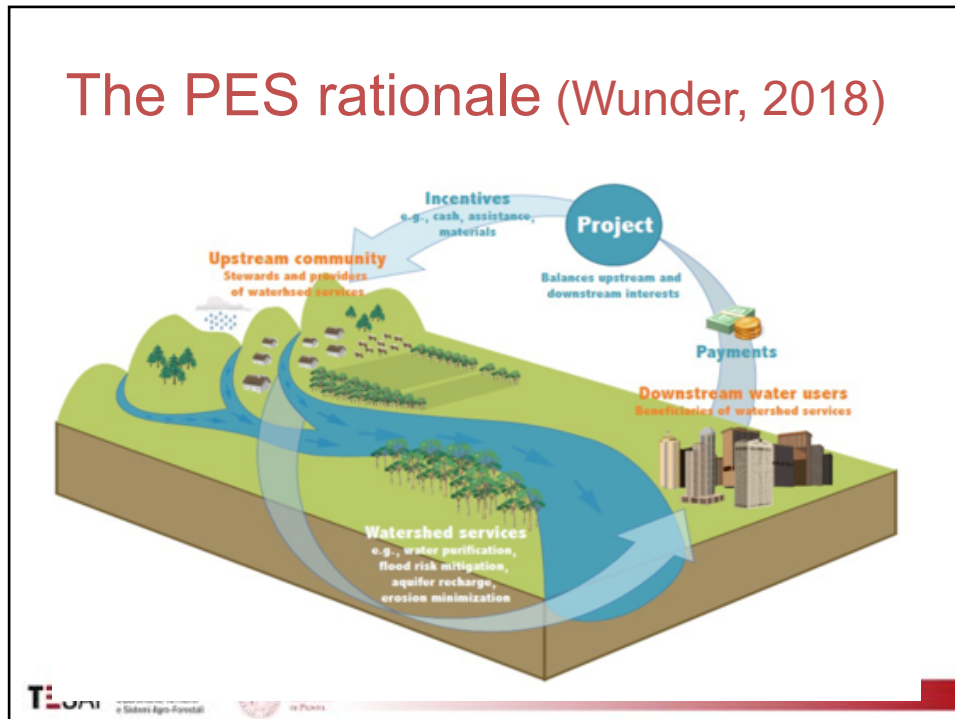
30-year long contracts with all farmers within the watershed area to reduce the use of nitrates and enhance agriculture and forestry practices:



- **1 700 ha** converted from corn to set-aside or other crops
- **92%** of the area under some protection form
- About **200 €/ha/yr.** compensation to farmers for missed revenues
- About **25 M €** invested by Vittel in the first 7 years (i.e. **1.52 €/m³** of bottled water)

→ Similar initiative by Coca Cola in Southern Portugal: **17 €/ha** to FSC certified forests hosting and managing water-filtration areas

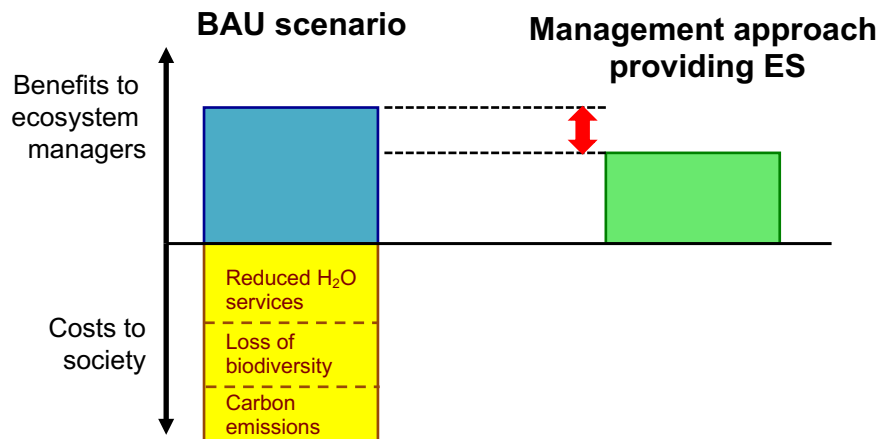
The PES rationale (Wunder, 2018)



Arguments for PES (Wunder, 2018)

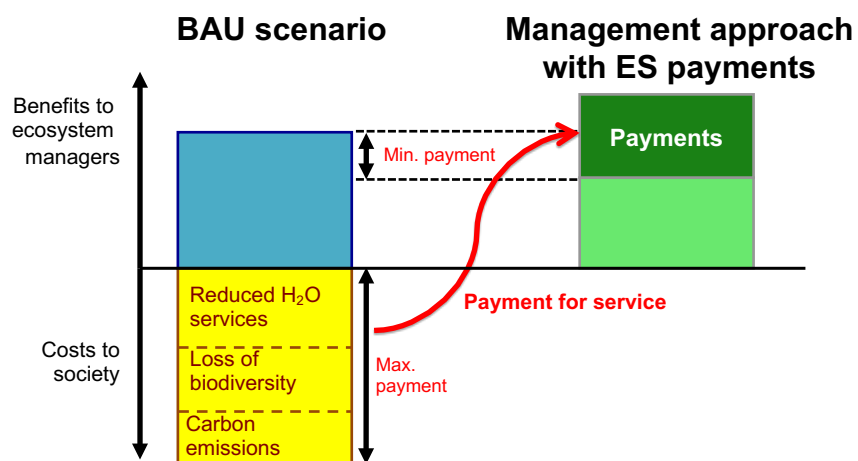
- Why “pay the polluter” principle, not *vice versa*?
- PES are legitimate (= voluntary, negotiated)
- PES are direct (= *quid pro quo* contract)
- PES are adaptive (flexible design)
- PES may have efficient and equitable outcomes

PES: the rationale (2/3)



Source: Engel, Pagiola & Wunder, 2008

PES: the rationale (3/3)



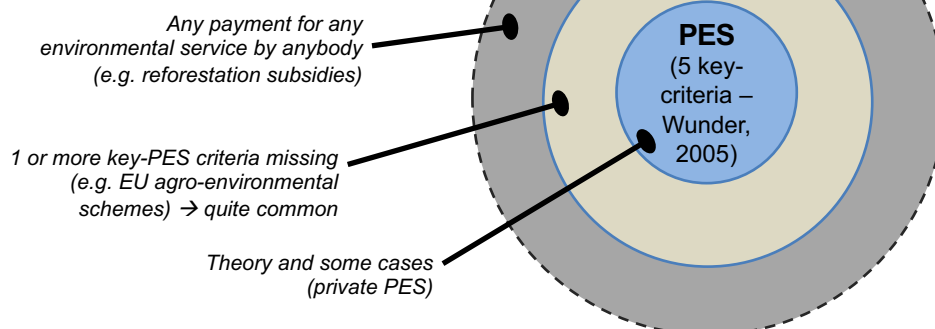
Source: Engel, Pagiola & Wunder, 2008

Some PES pre-conditions

- **Conditionality** → service providers are to receive payments **only when** their efforts to produce detectable changes reflect in the quality/quantity of the service
- **Additionality** → payment should yield environmental benefits that **would have not have been occurred** without it
- **Permanence** → the scheme should be **self-sustained**. How long will it remain in place after public funding is finished?
- **Leakage** → avoidance/management of **indirect negative effects** and trade-offs occurring on the same ecosystem service or on the same ecosystem providing the service

PES, PES-like and other incentives

- Are the 5 key-PES criteria always met?



Outline

- The drivers: the need for new tools in (environmental) policies
- **Some case studies**
- Barriers and challenges for PES development
- Final remarks

Case studies, with special reference to the experiences in Italy

1. PES

- Water table enrichment: *Bosco Limite*
- Water catchment and storage: the *Romagna Acque* experience with the Ridracoli dam for providing drinking water

2. PES-like

- Galli Law for drinking water tariff definition
- Water catchment and storage for hydropower generation

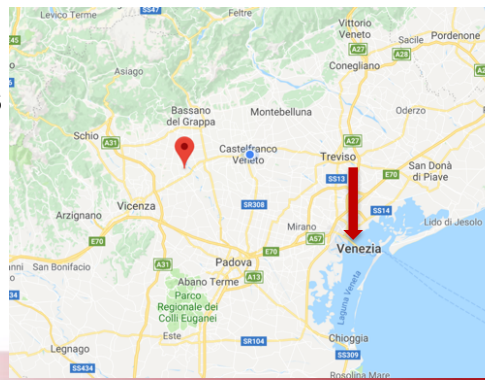
1. PES case studies

Bosco Limite



The Forest (Bosco Limite) in Carmignano di Brenta

The problem: lowering of the water table + problems associated to farmland intensification



TESAF

Dipartimento Territorio
e Sistemi Agro-Forestali



Università
degli Studi
di Padova



TESAF

Dipartimento Territorio
e Sistemi Agro-Forestali



Università
degli Studi
di Padova



TESAF Dipartimento Territorio
e Sistemi Agro-Forestali



Università
di Pavia

Providers

The farmers owning and managing the land

Payers (beneficiaries)

Private citizens (planted trees), students (env. education), bee keepers, hunters, ...

Local public authorities

sponsors, supporters,
some incentives
connected to EU Rural
Development Program



TESAF Dipartimento Territorio
e Sistemi Agro-Forestali



Università
di Pavia

Impacts



bosco|limite
natura fuori porta

- Home
- Chi siamo
- Scegli la pianta
- Sponsor
- Crea il tuo Bosco Limite
- Visita ed esplora
- Contatti
- News

AGRICOLTURA: CRESCITA ECONOMICA E SOSTENIBILITÀ AMBIENTALE

Sai un proprietario agricolo? Possiedi un terreno? Se non sei pienamente soddisfatto della tua azienda o del suo impatto e vuoi ottimizzare i profitti portando anche beneficio a tutta la...
[illegible]

Il Bosco Limite è sempre al lavoro! Da quando sei arrivato su questo sito:

- 1
- 0.07 kg
- 17.10 s

- 1,500 tons of CO₂ sequestered in 30 years
- 12,000 m³ stored every year
- 200 l/sec of infiltration (1 M m³/ha/yr)

Follow us!   

www.boscolimite.it

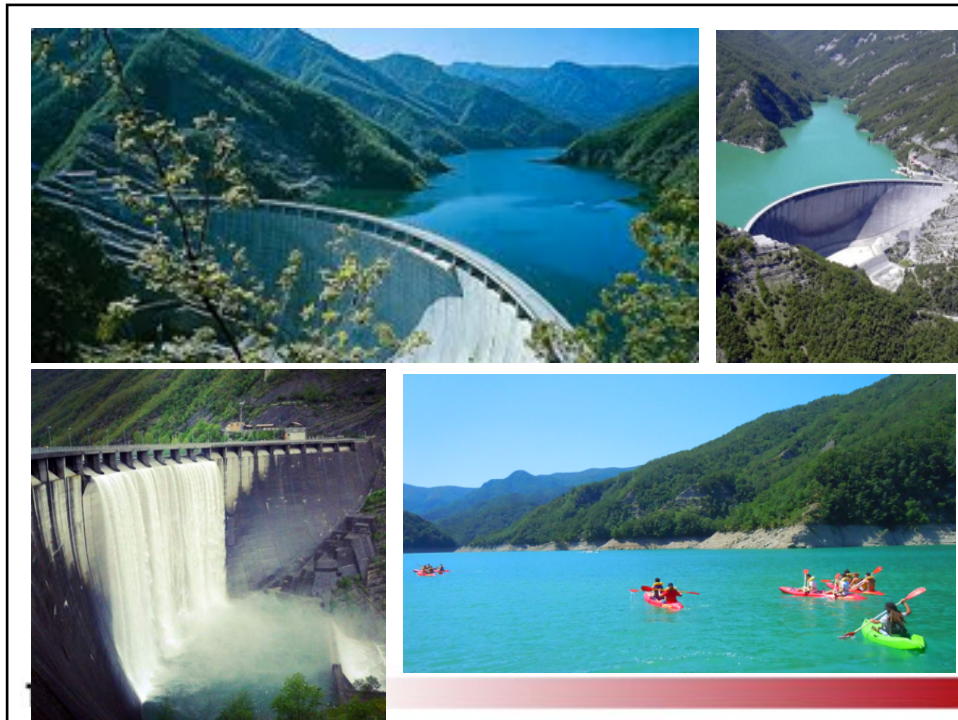
TESAF Dipartimento Territorio e Sistemi Agro-Forestali  Università degli Studi di Pavia

1. PES case studies

Romagna Acque
and the Ridracoli dam (1/2)



- A public company controlled by the local administrations (Province and Municipalities)
- A dam built in 1982; capacity of 33 M m³; more than 100 M m³ of high quality drinking water provided/year
- Almost 50% of the total Romagna drinking water consumption



Romagna Acque and the Ridracoli dam

- From 1982 to 2007: **25 years** of constant **forest management investments** in the catchment basin area: an almost fixed amount of **4%** of the total company revenues from water tariff, equal to a **annual PES of 5-600,000 €**
 - Initial sediment transport volume (1982): 42,600 m³
 - Today sediment transport volume: <30,000 m³
- Now: no more investments needed (a part from ordinary maintenance works and environmental education)

From *Romagna Acque* experience
a lesson learned →

National Frame Law: no. 36 in 1994

2. PES-like case studies

National Frame Law: no. 36 in 1994

- Till **3% of the tariff payment** can be used by Water authorities for **public works in the catchment areas**
- Only 2 (3) Regions have decided to implement the law: Piedmont, Veneto (and Emilia-Romagna).
 - Piedmont: funds are managed by the Unions of Mountain Municipalities only for **ordinary maintenance**
 - Veneto: **all public works** in the catchment area are financed

Is this a PES?

- Payments are activated only through **lobbying** (the representatives of the land owners are weaker than the local water authorities, always oriented to reduce their tariff)
- Investments in the catchment areas are **not always based on clear criteria** (in Veneto they are used for all public works, some of them – i.e. mountain road construction – having negative externalities on water quality!)
- In any case, a PES-like scheme based on a public regulative frame with **no direct payment to the externality providers**

2. PES-like case studies

Hydro power generation

- In the past the **first source of renewable energy** in Italy (5.1% of total final consumption)
 - **Long-lasting discussion**: the poor “Mountains” providing energy to the rich “Plain”
- National frame law: no. 959 in 1953: **compulsory compensation**
- Payment based on **power of hydroelectric plant** (>220 kW): **30.4 €/kWh installed/year**
 - **Extra payment** for the Municipalities that have the catchment area or host the power plant (5.3 €/kWh)
 - **Beneficiaries**: Municipalities, frequently organised in Consortia (BIM – **Bacini Imbriferi Montani**)
 - Numbers: **69 BIMs**; **1,684 Municipalities** involved; **252 dams**; 518 power plants

Criteria to distribute the payment among the Municipalities (Source: Decree Ministry of Public Works)

- **10% flat rate** shared equally among Municipalities
- **20%** paid in relation to the **territorial area** of each Municipality
- **30%** paid in relation to the **population** of each Municipality
- **40%** paid in relation to the localisation of various **infrastructures** (dam, power plant, torrents, channels, ...)

Use of money raised by the PES

- **Public works:** infrastructures, social services, cultural events (recently: renewable energy generation and distribution)
- **<5%** administrative costs
- **Local politicians** are the decision makers (aim: to raise the voters' consensus)

Is this a PES?

- Payments are **based more on damages** due to infrastructures **than on land services** (water provision, sedimentation reduction). Some infrastructures are providing positive externalities
- Payments are given to **public institutions** that are **not** exactly **the same** responsible **for mountain development**
- So, a PES-like scheme based on a public regulative frame with **no direct payments** to the externality **providers**

Outline

- The drivers: the need for new tools in (environmental) policies
- Some case studies
- Barriers and challenges for PES development
- Final remarks

Some barriers in the development of PES initiatives

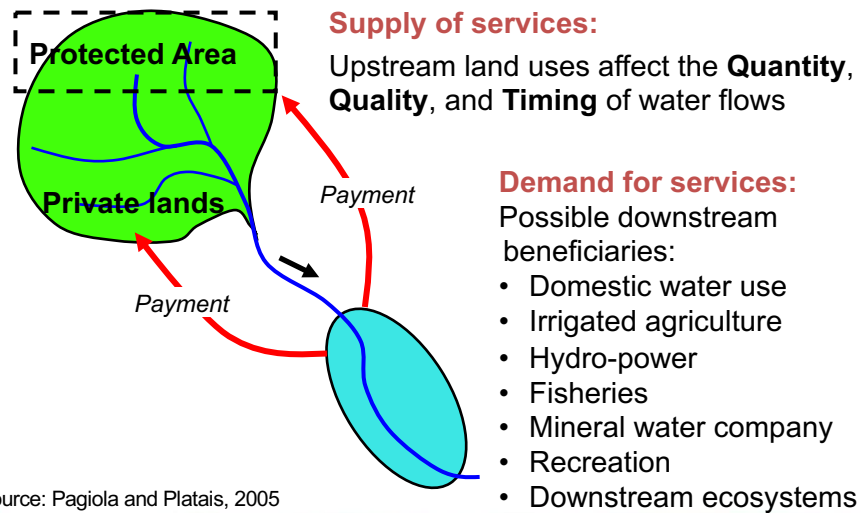
Barrier category	Challenges
Informational	Lack of awareness among beneficiaries and providers
Technical	Scientific uncertainty, Baselines, Leakage, ES valuation, Excludability and free riding, Shortage of skills and experience
Spatial	Spatial variability of ES
Temporal	Permanence, Time lags, Different time horizons
Financial	Perceived risks, High start-up and Transaction costs
Institutional	Perverse incentives, Complex policy environment
Legal	Property rights and other issues
Cultural	Aversion to paying for ES, Lack of trust, Terminology
Equity	Perceived unfairness

Source: modified from DEFRA, 2011

Some barriers in the development of PES initiatives

- **Scientific/Technical barriers**, e.g. cause-effect links not always clear between ecosystem functions and ES (more direct for carbon, less evident for water-ES)

PES: the rationale



TESAF Departamento Territorio e Saneamento Agro-Forestal



Some barriers in the development of PES initiatives

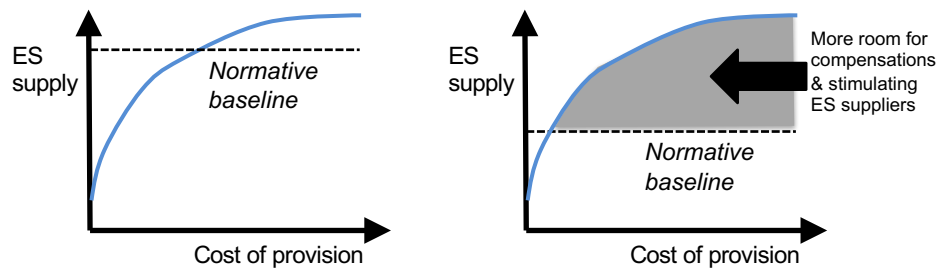
- **Scientific/Technical barriers**, e.g. cause-effect links not always clear between ecosystem functions and ES (more direct for carbon, less evident for water-ES)
- How to **set ES prices** for the market?

TESAF Departamento Territorio e Saneamento Agro-Forestal



How to set ES prices for the market?

- The prevailing approach by State actors → **cost of provision** (a robust framework adopted by EU Rural Development Program, EU WFD,...); high normative **baselines** might be a limitation



- An alternative criteria: the value of the service → **beneficiary's WTP** (normally higher than the cost of provision)

Some barriers in the development of PES initiatives

- Scientific/Technical barriers**, cause-effect links not always clear between ecosystem functions and ES (more direct for carbon, less evident for water-ES)
- How to **set ES prices** for the market?
- Many actors, negotiation needed, several middlemen → increased **transaction costs**, possible **conflicts**

A “classic” example Vittel Mineral Water (Vosges, France)

30-year long contracts with all farmers within the watershed area to reduce the use of nitrates and enhance agriculture and forestry practices:



- **1 700 ha** converted from corn to set-aside or other crops
- **92%** of the area under some protection form
- About **200 €/ha/yr.** compensation to farmers for missed revenues
- About **25 M €** invested by Vittel in the first 7 years (incl. **1.52 €/m³** of bottled water)

10-year long negotiation process!

Some barriers in the development of PES initiatives

- A **consolidated perception**: ES given for granted → why should we pay (more) for them?
- Definition/reform of **property rights**

Financialization and commodification of natural resources (Kill, 2014)

A process whereby the natural functions and processes of forests, woodlands, meadows, mountains and other natural areas become treated as a range of 'ecosystem services' including biodiversity, regulation and filtration of water, carbon storage and sequestration, the economic value of which can be calculated and expressed in monetary terms.

Financialization transforms both everyday perceptions and policy, **and involves not only the framing and valuation** of these natural spaces **in economic terms** via commodification, monetization, commercialisation, **but also their integration into financial markets as a tradable asset.**

Some barriers in the development of PES initiatives

- **Ethical issues:**

→ **financialization** and commodification of nature (Kill, 2014)

→ market-based instruments and ethical motivations to manage public goods (*"I will supply an ES only if they pay me"*)

→ **distribution** effects, **equity**

- **Institutional and governance issues** → a new role for public institutions (facilitators)

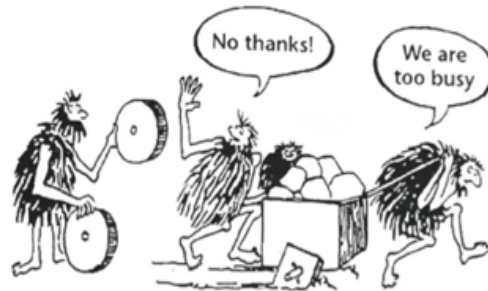
Outline

- The drivers: the need for new tools in (environmental) policies
- Some case studies
- Barriers and challenges for PES development
- **Final remarks**

- Great emphasis on ES and PES by policy makers, environmentalists, academia but a **limited number of pure PES initiatives** implemented so far
- WTP higher for **small-scale, local initiatives**, with well-identified, local beneficiaries; a problem in **scaling up**
- **Several examples of quasi-PES (PES-like) initiatives**: border with ordinary financing mechanisms not always clear
- A **number of initiatives and experiences aiming to value ES** but lack of a systematic approach and common vision

The broad set of tools to promote ES needs a new role and much higher level of **multi-level & multi-sectoral governance by public institutions**

...but public institutions are not always open and reactive to a rapidly changing world



Presentation available on the web. Search for "pettenella"