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# Making Payments for Ecosystem Services (PES) Work

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# Objectives

To answer three questions:

- What are PES?
- What can they be expected to achieve?
- What lessons can be learned from experience on the efficient design of PES schemes?

# The problem

- While markets exist for some ecosystem services (foods, fuels, fibers) they do not exist for others that benefit or harm people (regulation of water quality and quantity, provision of habitat for beneficial species, prevention of soil erosion, pest and disease control etc)
- The provision of such services is accordingly 'external' to the management decisions of farmers.

# Example 1: Disease control externalities

Farm management can increase or decrease infectious disease risks.

- Large-scale irrigation systems based on dams, reservoirs and canals increase habitat for the snails that are intermediate hosts for parasites causing *schistosomiasis* – but this risk can be mitigated by reducing the scale of the system.
- Irrigated rice paddies may serve as breeding grounds for the mosquitoes that transmit *malaria* and other human pathogens – but this risk can be mitigated by management of water flow and sedimentation



# Example 2: Water quantity and quality externalities

- Agriculture modifies the composition and root structure of the plant community, the production of litter, the extent and timing of plant cover, and the composition of the soil biotic community, all influencing water infiltration and retention.
- Practices that maximize plant cover (e.g. minimum tillage, polycultures, or agroforestry systems) decrease runoff and increase infiltration.
- Irrigation practices may influence runoff, sedimentation, and ground water levels in the landscape affecting surface and ground water quality.

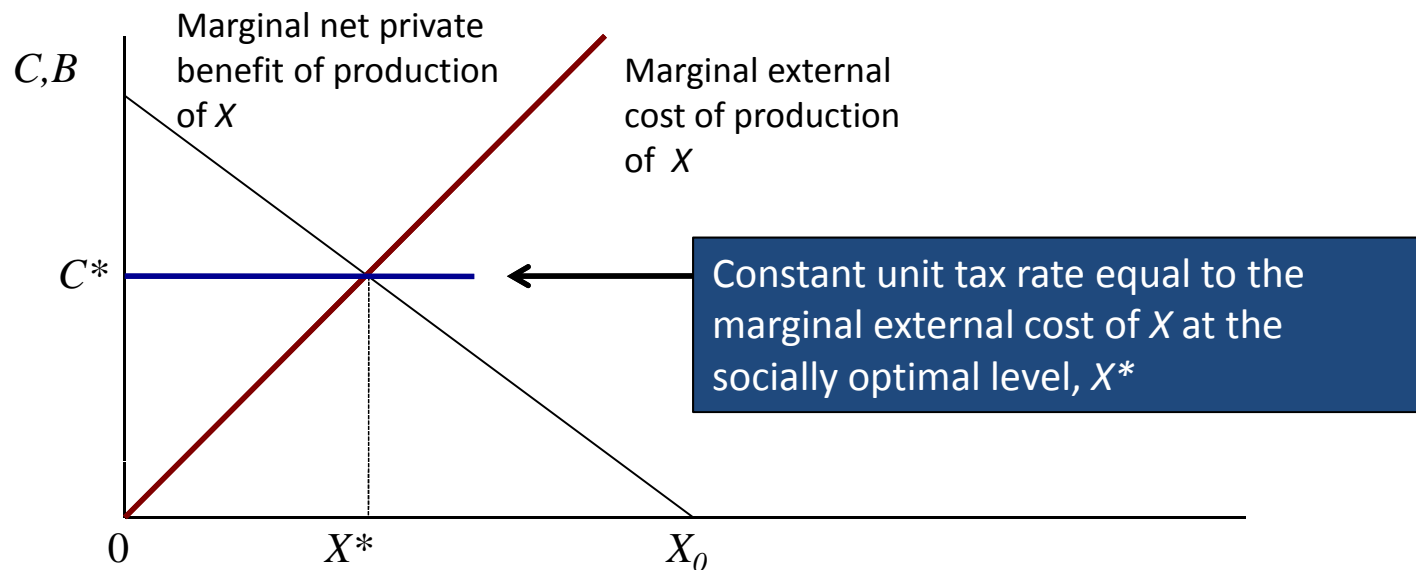


# Externality and market based instruments

- Economists have developed various instruments to internalize externalities of this kind including:
  - taxes,
  - subsidies,
  - user-charges,
  - access-fees,
  - penalties for non-compliance,
  - payments for ecosystem services
- PES schemes offer financial incentives for local actors to provide a wide range of ecosystem services untouched by normal market transactions.

# Environmental taxes

- Environmental externalities may be internalized through the application of taxes equal to the marginal external cost of the activity concerned.
- Production of  $X$ , an externality generating activity, may be subject to a tax equal to the marginal external cost of deforestation at the socially optimal level.



# Payments to internalize positive off-site environmental externalities

- Payments for Ecosystem Services (PES) schemes address the market failures involved where ecosystem services are 'public goods' or 'externalities' of market production.
- PES schemes are designed to stimulate transactions in which a an ecosystem service is bought by users from providers.
- The payments involve a positive incentive to the provider, and are conditional on performance.
- Because of the difficulty in measuring many environmental services directly, payments may be based on either the actions of the service providers or on indirect ecological indicators.

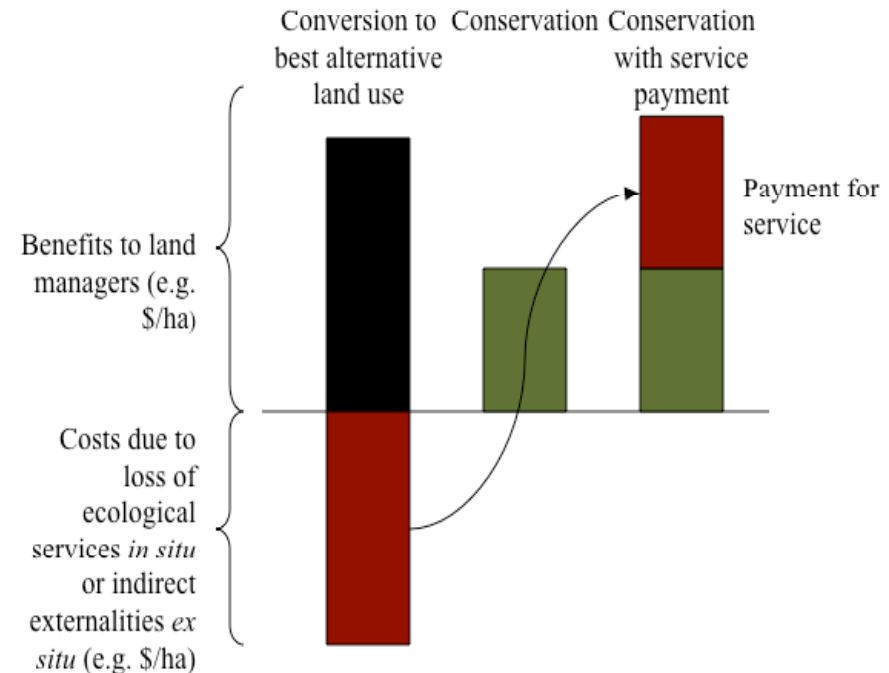


# Current status of PES schemes

- Hundreds of PES schemes are being implemented around the world covering four main ecosystem services:
  - water provisioning,
  - carbon sequestration,
  - landscape amenity, and
  - biodiversity conservation.
- Most current PES schemes are local level arrangements and involve spontaneous, private markets.
- Large PES schemes tend to be government driven, working at the state and provincial level (e.g. in Australia, Brazil, China and USA), or at national level (e.g. Colombia, Costa Rica, China and Mexico).

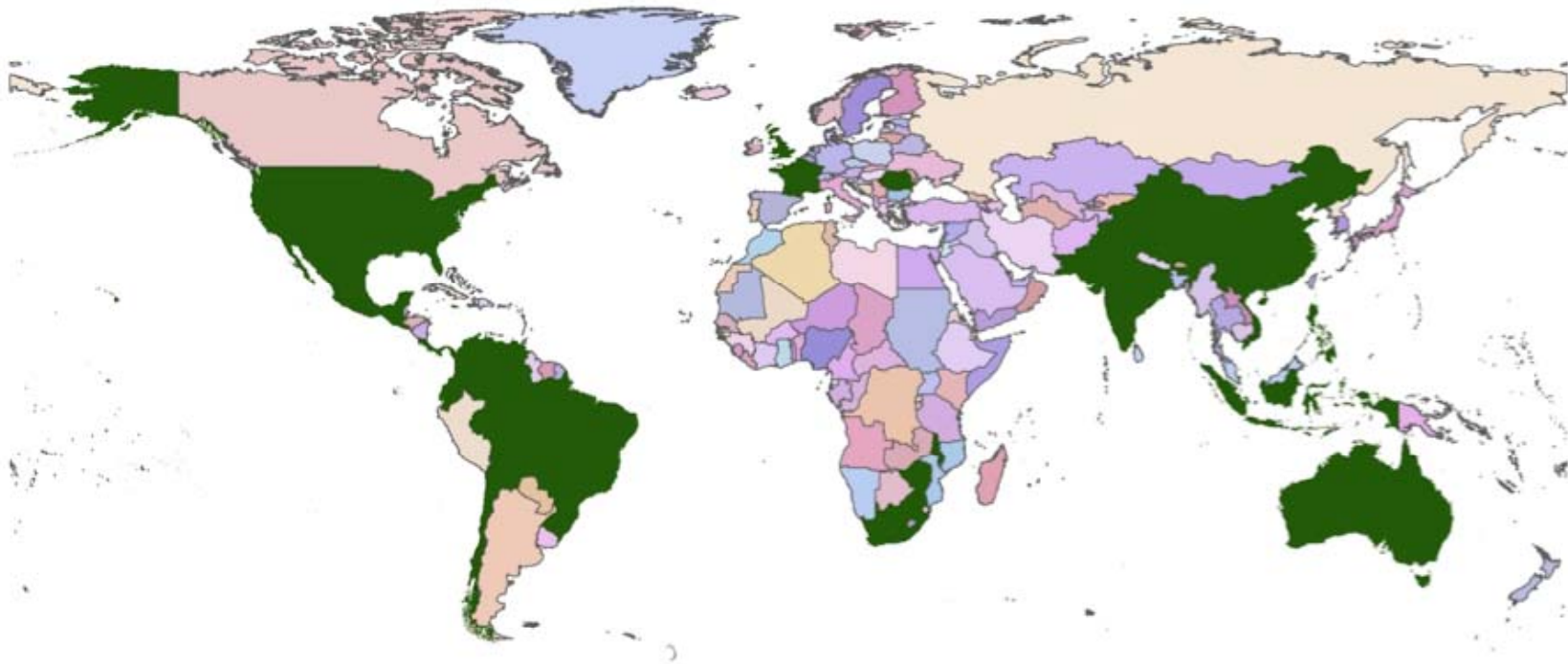
# Payments for ecosystem services

- If land users do not receive compensation for the production of valuable ecosystem services, they will not provide them.
- PES systems, like other market mechanisms, induce land managers to incorporate the economic value of ecosystem services into their financial decisions.
- Their principal attraction is that they enhance efficiency.



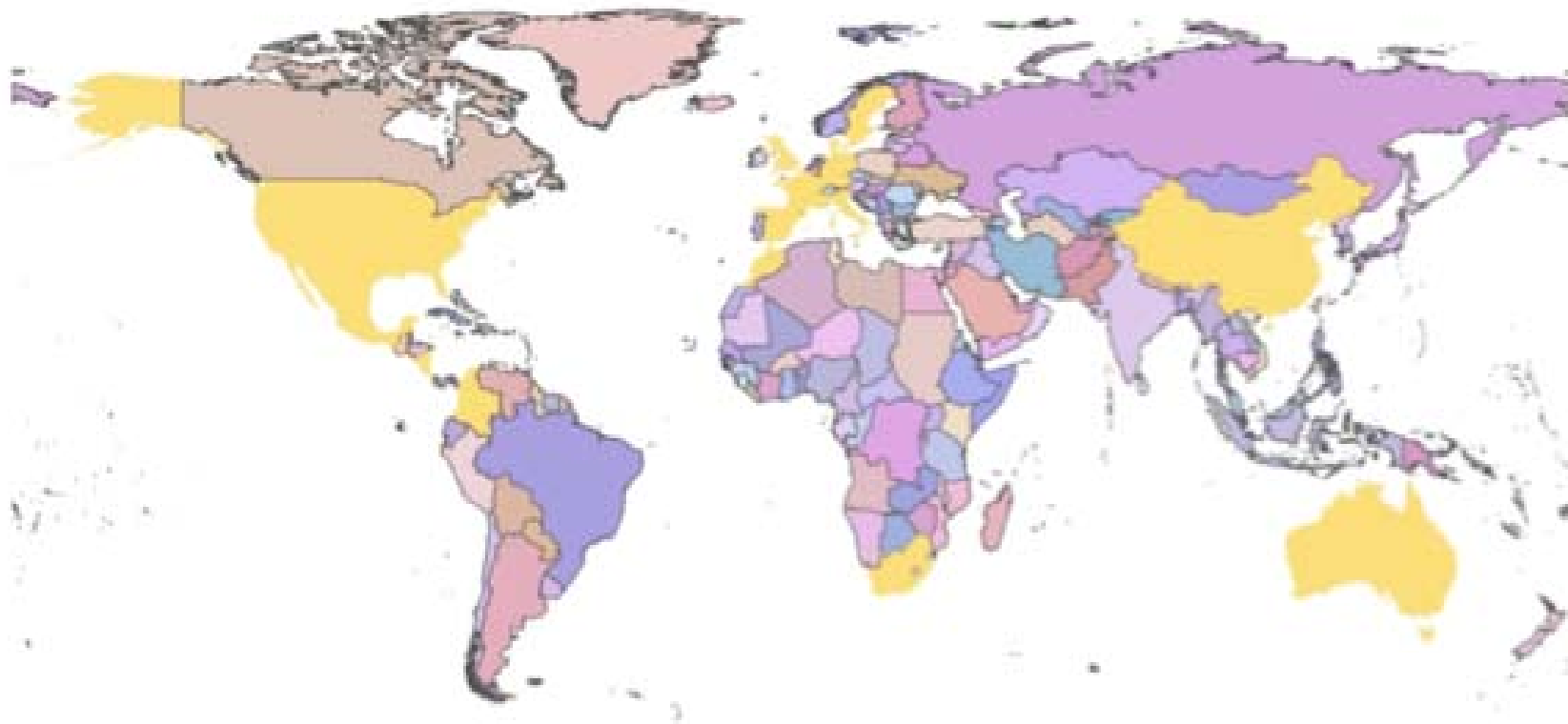
# PES schemes for water provision

- PES schemes for water provision exist in all countries shaded green.



# PES schemes for agrobiodiversity

- Countries implementing schemes for agrobiodiversity are shaded yellow.



# Examples of Government PES schemes for agriculture

Case, Country	Environmental Services		Buyer	Seller	Targeting Criteria	Payment Scheme
	Paid for	Not-paid for				
Environmental Quality Incentives Program, USA (Claassen <i>et al.</i> , 2008)	Watershed protection, biodiversity conservation (benign agriculture & agricultural land retirement)	Landscape beauty	US government	US farmers	Participants are selected based on environmental benefits and cost index	Annual cash payment. A reserved price is based on the rental value of land adjusted for its productive capability
Conservation Reserve Program, USA (Claassen <i>et al.</i> , 2008)	Watershed protection, soil conservation, wildlife protection and carbon sequestration (benign agricultural practices and agricultural land retirement)	Landscape beauty	US government	US farmers	Participants are selected based on environmental benefits and cost index	Annual cash payment. A reserved price is based on the rental value of land adjusted for its productive capability
Environmentally Sensitive Area and Countryside Stewardship Scheme, UK (Dobbs and Pretty, 2008)	Biodiversity, recreation and watershed protection (benign agriculture & agricultural land retirement)	Carbon sequestration	UK government and European Union	Farmers in targeted areas	The ESA is open to all farmers in targeted areas and CSS selects participants	Cash payments

# Examples of private PES schemes involving farmers

Case, Country	Environmental Services		Buyer	Seller	Targeting Criteria	Payment Scheme
	Paid for	Not-paid for				
The Vittel (Nestlé Waters) watershed protection program, France	Watershed protection (best practices in dairy farming)		Vittel	Dairy farmers (27 farmers enrolled)		Cash payments are based on new farm investment and the cost of adoption of new farming practices
Los Negros, Bolivia	Watershed and biodiversity protection (forest and páramo conservation)		Pampa-grande municipality, US Fish and Wildlife Service	Santa Rosa farmers (46 landowners)		In kind plus technical assistance

# Evaluation of the effectiveness of PES schemes

<i>Case</i>	<i>Efficiency Score</i>					<i>score</i>
	<i>participants</i>	<i>service</i>	<i>additionality</i>	<i>penalties</i>	<i>Cost basis</i>	
<u>Scolet Té Project, Mexico</u>	5	5	5	5	3	23
<u>Regional Integrated Silvopastoral Project, Nicaragua</u>	5	5	4	5	3	22
<u>PROFAFOR, Ecuador</u>	5	5	5	5	1	21
<u>Pimampiro, Ecuador</u>	5	5	3	2	5	20
<u>Grain to Green Program, China</u>	5	3	3	3	1	15
<u>Working for Water Program, South Africa</u>	3	3	5	1	1	13
<u>Payments for Hydrological Environmental Services, Mexico</u>	5	3	1	2	2	13

Arriagada R. and C. Perrings (2009) Making Payments for Ecosystem Services Work, Working Paper, UNEP, Nairobi.

# Effectiveness of process: WfW

<i>Case</i>	<i>Clear definition of participants</i>	<i>Clear definition of service</i>	<i>Additionality</i>	<i>No compliance penalties</i>	<i>Opp cost vs ecosystem services provision cost</i>
Working for Water Program, South Africa (Turpie <i>et al.</i> , 2008)	ecosystem services sellers are roving service providers in the form of small-scale contractors who perform restoration work on land under any type of ownership	The objective of the program is to control invasive alien plants to improve water delivery, biodiversity conservation and land productivity	The WfW program has been hailed as highly successful in terms of its objective of restoring water supply in alien infested catchments	The program works self-supervised by the Working for Water and does not include sanctions	Opportunity costs are low because no land use is displaced and treated land is likely to be more productive. Labor costs are low as the labor employed has few alternative formal sector employment opportunities

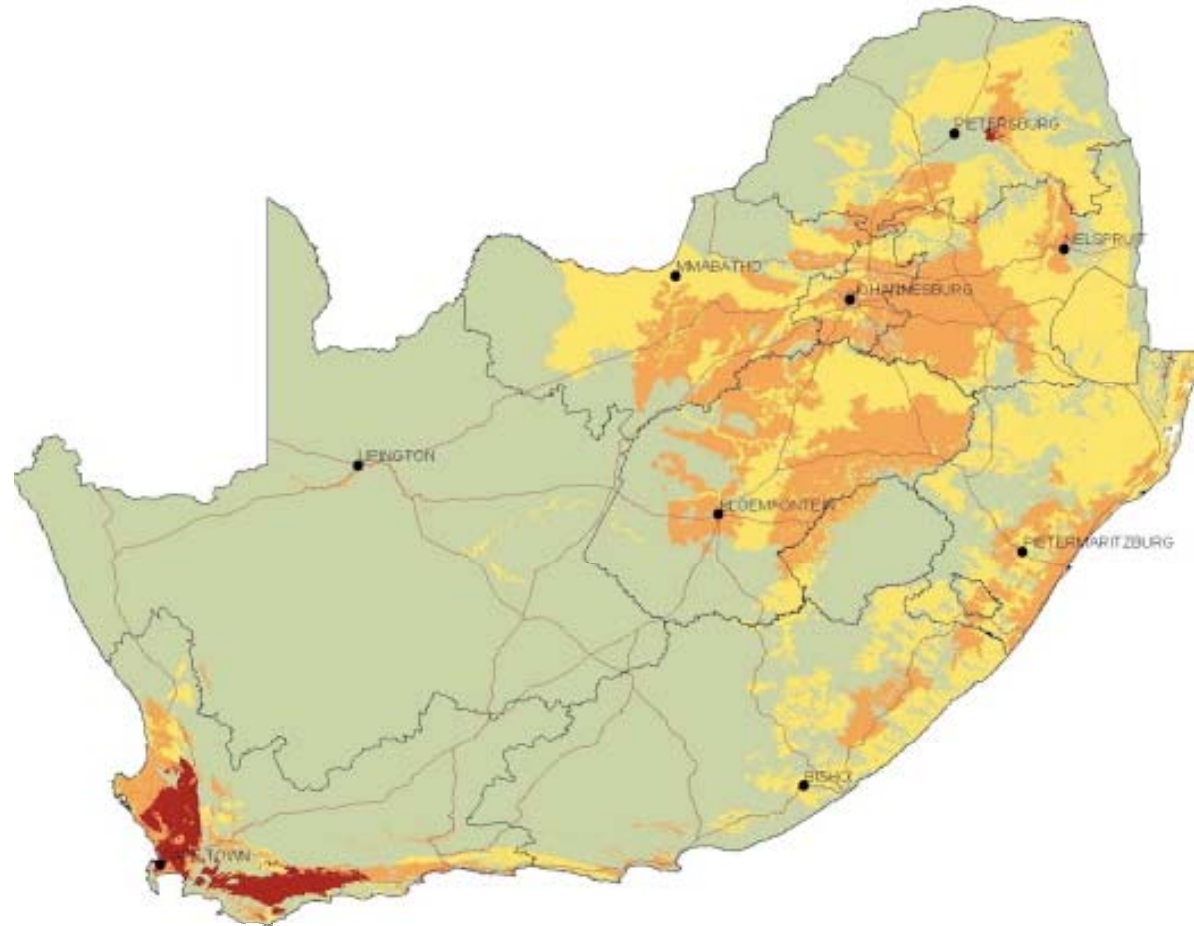


# Working for Water: the problem

- Invasive plants in the Sonderend catchment are estimated to have reduced river flows by 7% and have the potential, if uncontrolled, to reduce the flow by more than 40%.
- Pines account for more than half the volume of water, *A. mearnsii* a further 20%, eucalypts 12% and *Hakea* species 6%.
- At the current levels of infestation the costs of clearing the invaded area would be US\$ 13 million or US\$ 738/ha for the equivalent dense stands.
- Long-term maintenance after the initial programme is completed would cost about US\$ 0.4 million per year. The cost of the control programme would increase more than 6.5-fold over the next 11–16 years if no action was taken. The highest priority will be given to clearing the invaded riparian areas, starting with the most upstream invaders.

# Location of the problem

- An invasive species control program that focuses on benefits in terms of water yields.



Critically endangered,  
endangered and  
vulnerable ecosystems  
in South Africa

Turpie, J., C, Marais and J.M. Blignaut 2008. The working for water programme: Evolution of a payments for ecosystem services mechanism that addresses both poverty and ecosystem service delivery in South Africa, *Ecological Economics* 65(4): 788-798.

# The program

- Working for Water (WfW) program, launched in 1995 and administered through the Department of Water Affairs and Forestry.
- This program works in partnership with local communities, to whom it provides jobs, and also with Government departments including the Departments of Environmental Affairs and Tourism, Agriculture, and Trade and Industry, provincial departments of agriculture, conservation and environment, research foundations and private companies.
- Since inception, the program has cleared more than one million hectares of invasive alien plants providing jobs and training to approximately 20 000 people from among the most marginalized sectors of society per annum (52% women).

# Projects

- WfW currently runs over 300 projects using a range of methods to control invasive alien plants.
  - Mechanical methods - felling, removing or burning invading alien plants.
  - Chemical methods - using environmentally safe herbicides.
  - Biological control - using species-specific insects and diseases from the alien plant's country of origin. To date 76 bio-control agents have been released in South Africa against 40 weed species.
  - Integrated control - combinations of the above



# Additional incentives

- Associated initiatives include:
  - Legal responsibility for fire risks to neighboring properties
  - Legal responsibility for keeping land clear of invasive species
- Spin-off markets: As the hydrological benefits of WfW have become apparent, water utilities and municipalities have begun to contract WfW to restore catchments that affect their water supplies.
- This emerging PES system differs from others in that the service providers are previously unemployed individuals that tender for contracts to restore public or private lands, rather than the landowners themselves.

# Lessons for the design of PES schemes

1. User-financed programs are generally more efficient than government-funded programs.
2. PES should reflect their value to the different constituencies involved.
3. Provision of global ecosystem services through PES schemes (e.g. REDD) requires the involvement of both national governments and international representative bodies.
4. PES schemes should avoid negative spillovers (leakage), or provide benefits sufficient to offset unavoidable spillovers

# Lessons for the design of PES schemes

5. The positive incentives offered by PES schemes should be sufficient to 'internalize' the externalities of pre-existing market conditions.
6. PES design should be complemented by the measurement of ecosystem services produced through the scheme. Effective PES design is a necessary but not sufficient condition for PES schemes to work. Ultimately, it is necessary to ensure that they deliver additional benefits relative to the status quo.