



Using markets to preserve forests and the services they provide



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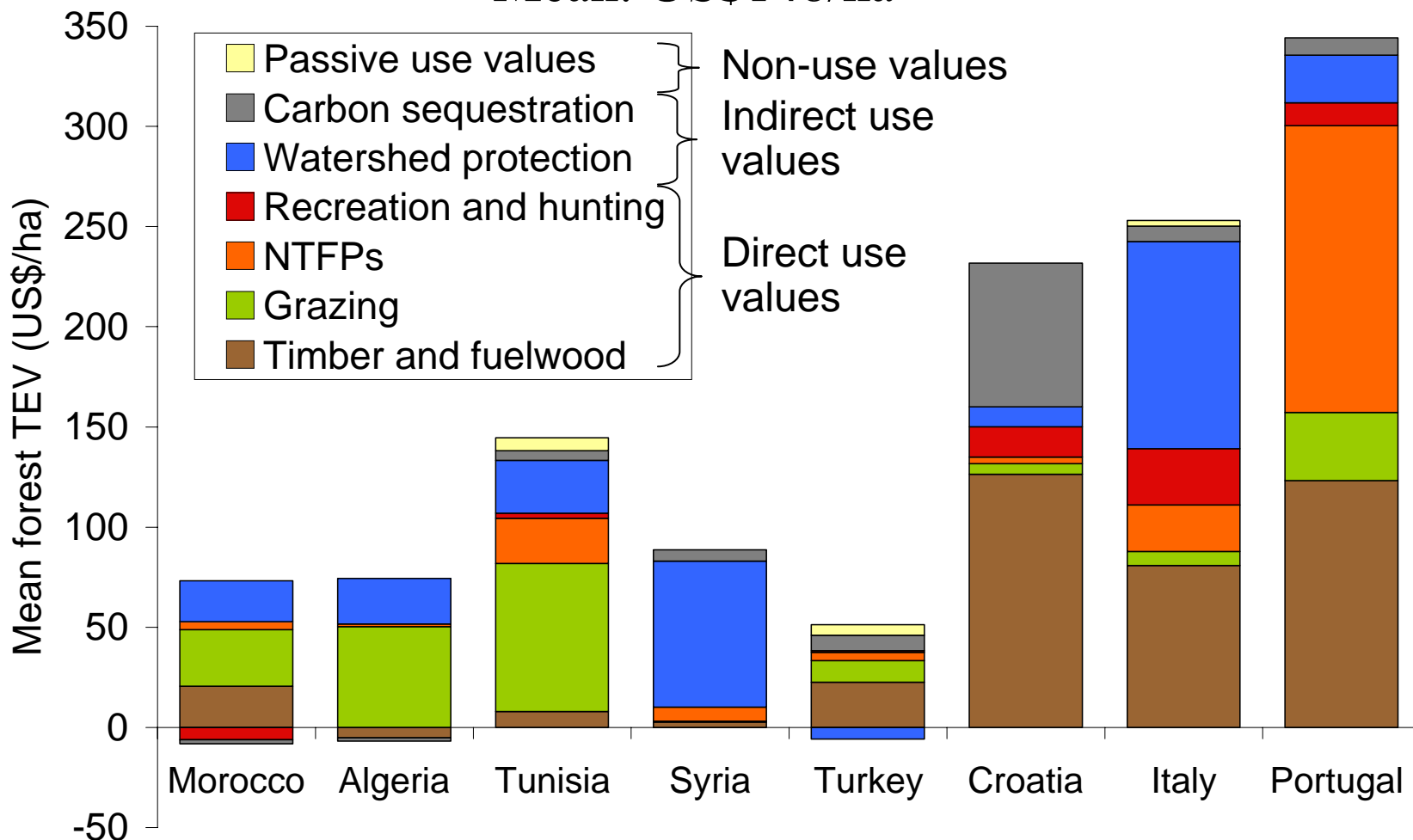
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Forests are more than just timber

Annual flow of benefits from Mediterranean forests

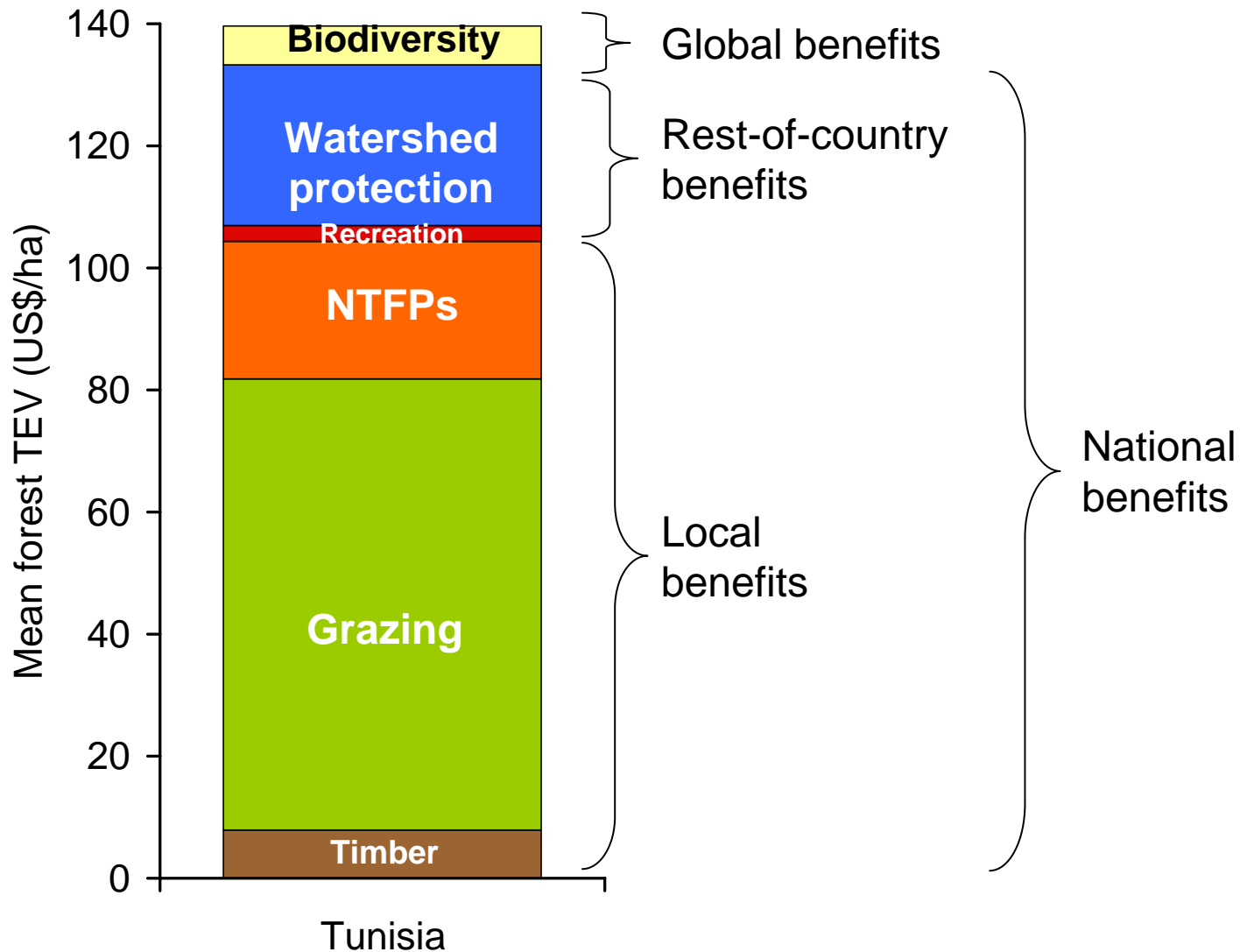
Mean: US\$148/ha



Source: Croitoru and Merlo, 2005

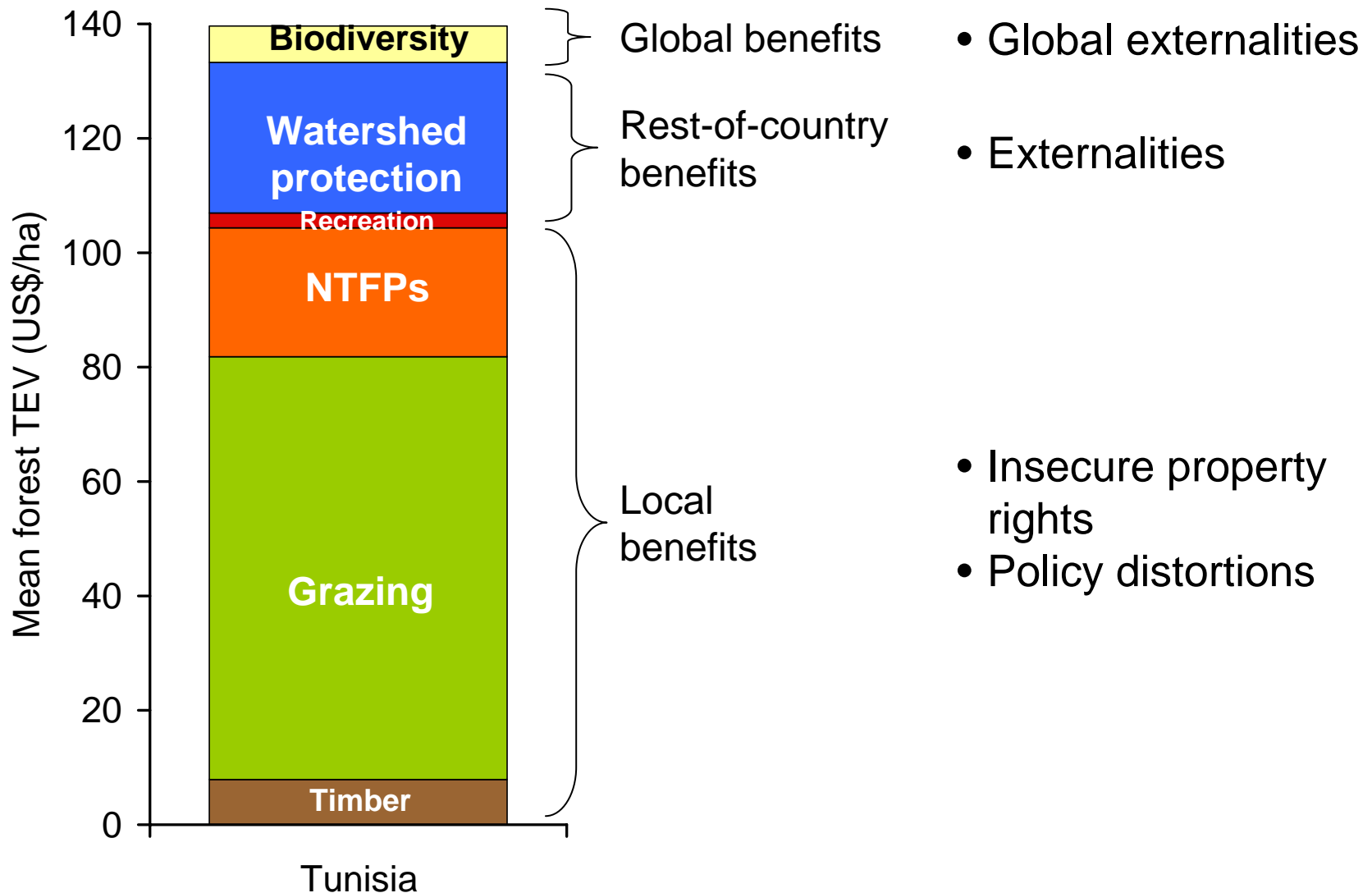
Who benefits from forests?

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Source: Croitoru and Merlo, 2005

Why are forests mismanaged?

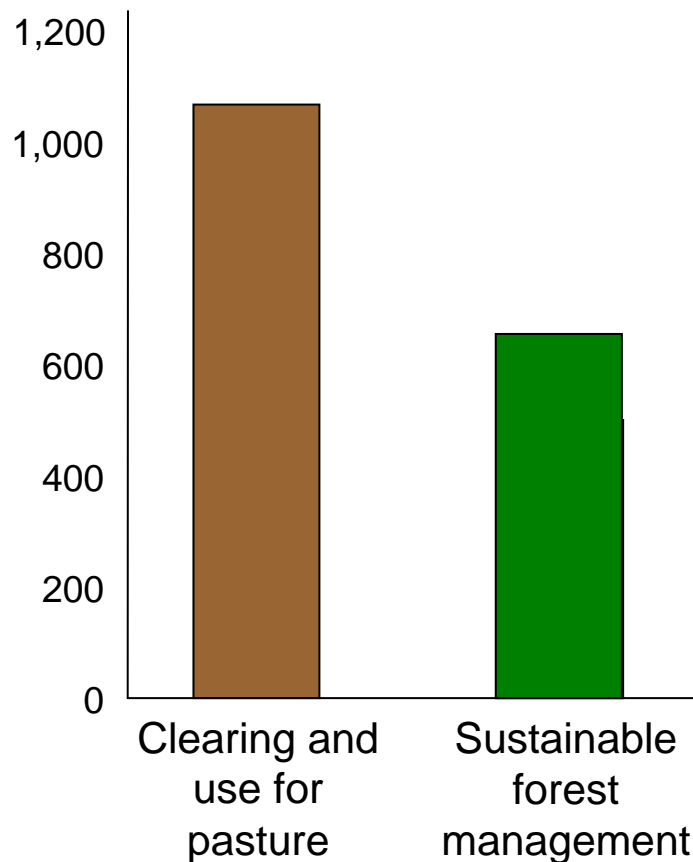


Source: Croitoru and Merlo, 2005

The Costa Rica Striptease

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Benefits of forest land to landowners, Costa Rica



Source: Based on Kishor and Constantino, 1993

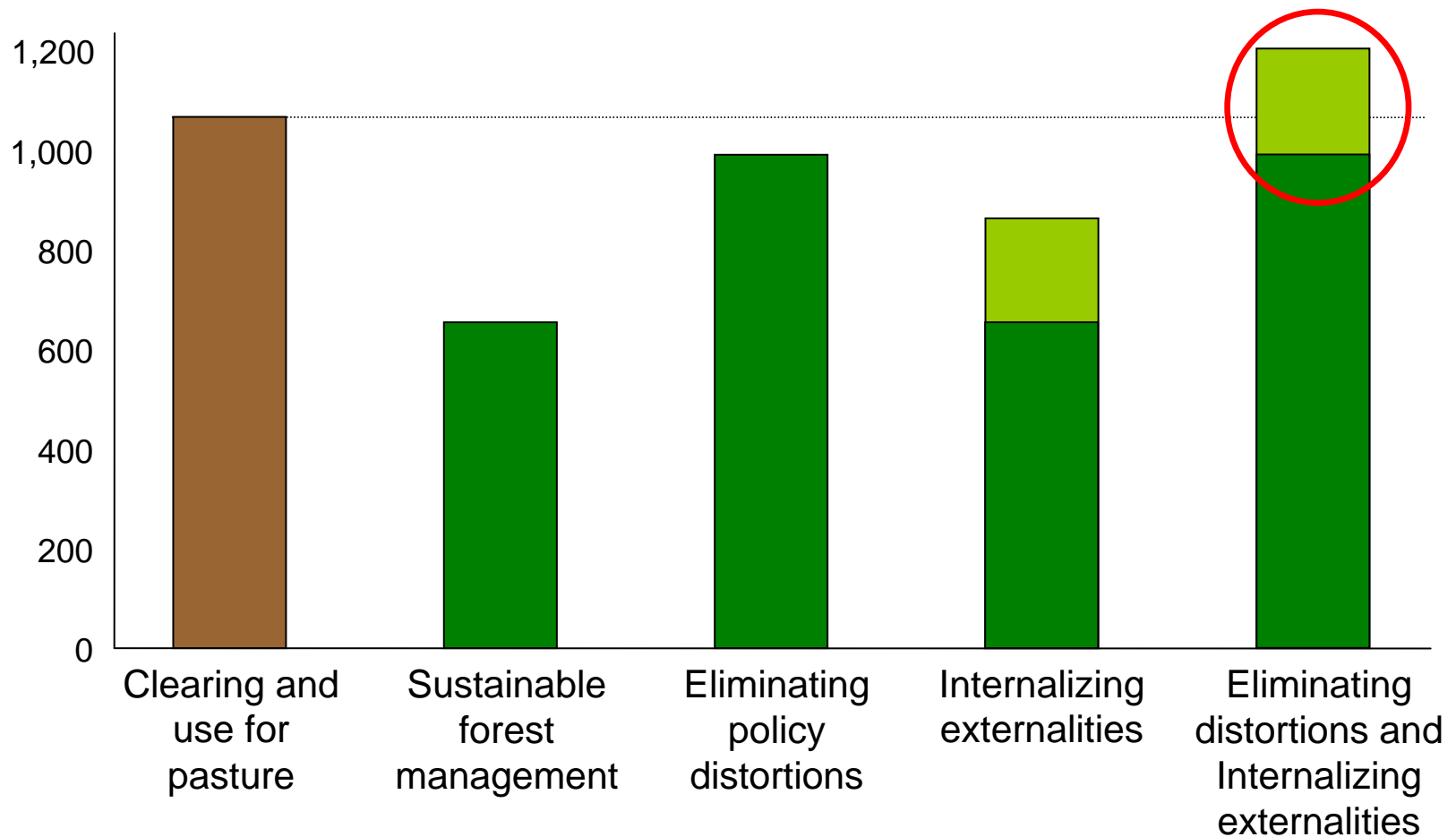


Source: Costa Rica Ministry of Energy and Environment

Need to address both policy distortions and externalities

Benefits of forest land to landowners, Costa Rica

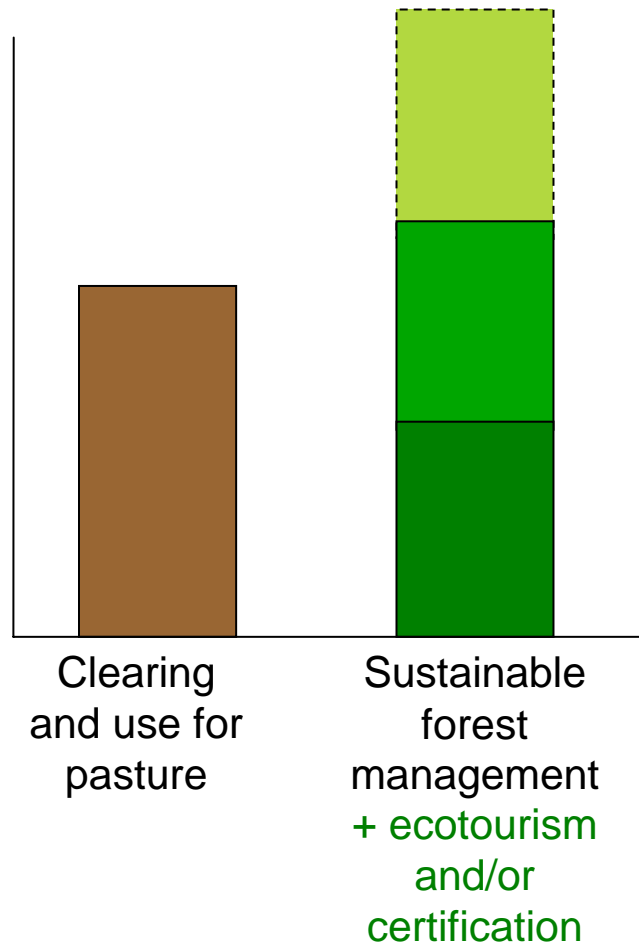
How do we do this?



Source: Based on Kishor and Constantino, 1993

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Benefits of forest land to landowners



Prior conditions:

- Secure property rights
- Eliminate policy distortions

Market-based instruments:

- Increase *direct* income
 - Ecotourism
 - Eco-certification
- Internalize externalities

Externalities caused by loss of forests Sasumua water treatment plant, Kenya

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Externalities caused by loss of forests Sasumua water treatment plant, Kenya

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Externalities caused by loss of forests Sasumua water treatment plant, Kenya

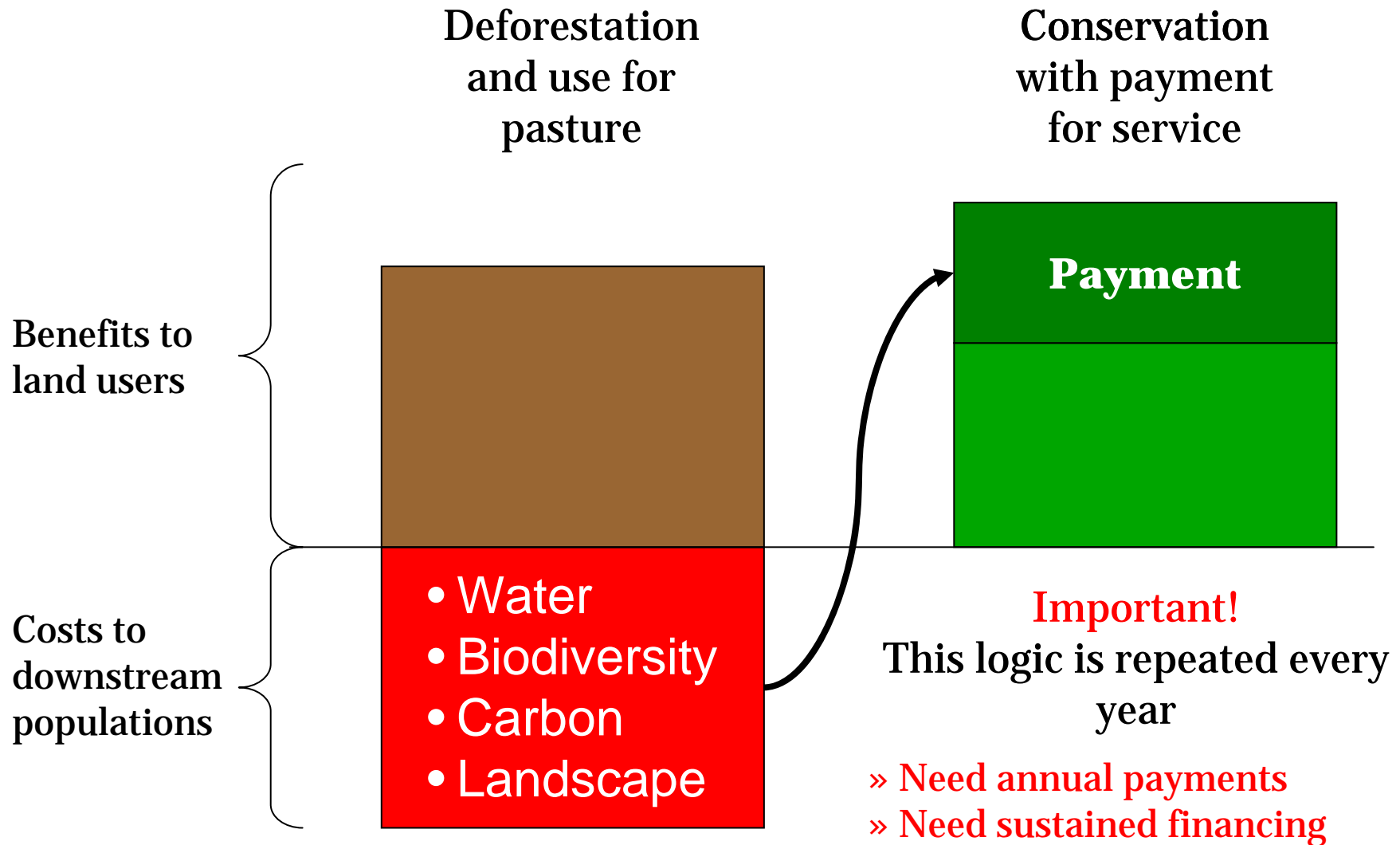
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**Treating for
contamination:
\$100,000/year**

**Clearing silt
from water intakes:
\$50,000/year**



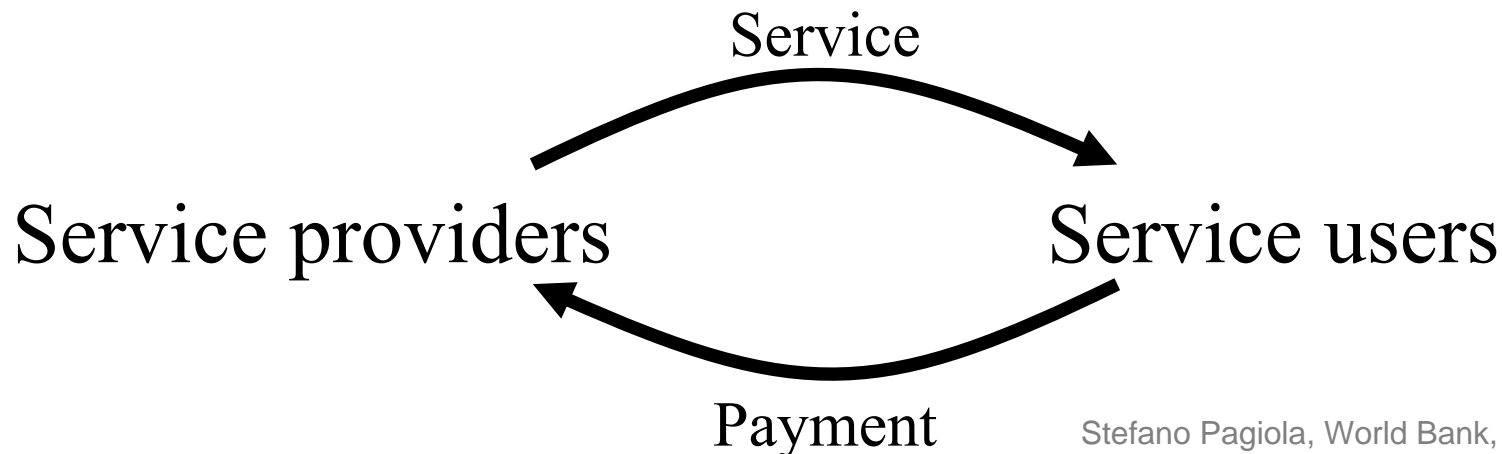
The logic of payments for environmental services



Definition of PES

A mechanism to improve the provision of indirect environmental services in which

- Those who provide environmental services get paid for doing so ('provider gets')
- Those who benefit from environmental services pay for their provision ('user pays')
- Payments are conditional
- Participation is voluntary



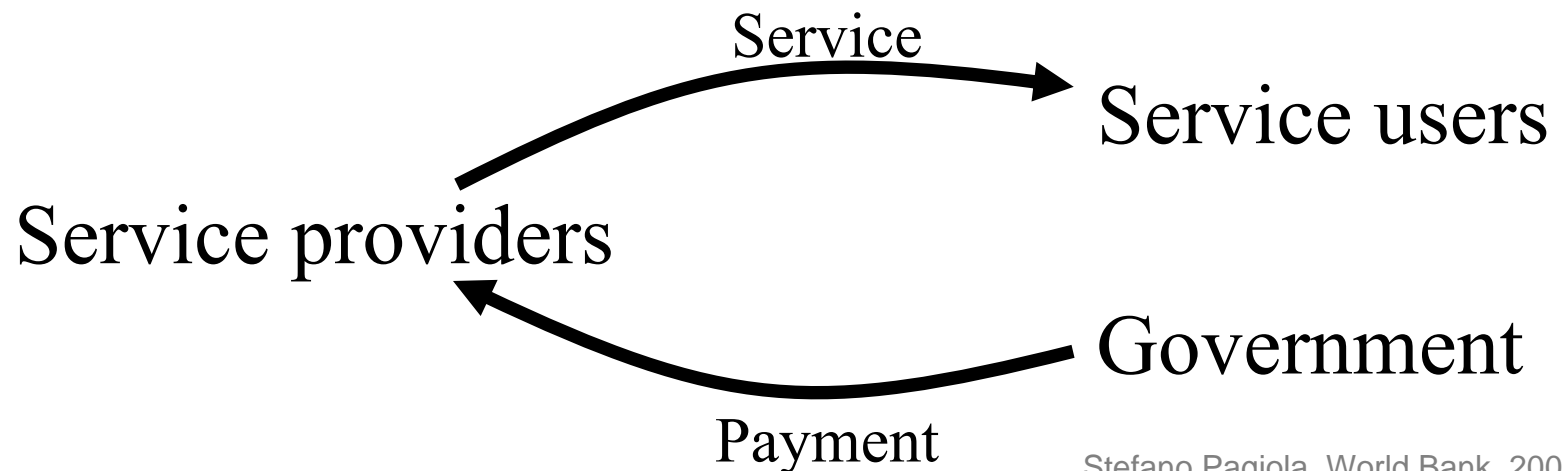
What makes payments for environmental services attractive?

- Generates it's own financing:
 - Brings new financing not previously available for conservation
- Efficient:
 - Focuses efforts where benefits of conservation highest and costs lowest
- Potentially very sustainable:
 - Not based on whims of governments, donors, NGOs, but self-interest of service users and providers
- For this to work, need to:
 - Base payments to providers on payments by users
 - Actually deliver services: getting the science right is critical
 - Tailor mechanism to specific local conditions

Special case: 'Supply-side PES'

A mechanism to improve the provision of indirect environmental services in which

- Those who provide environmental services get paid for doing so ('provider gets')
- The government (or another third party) pays for their provision
- Payments are conditional
- Participation is voluntary



What makes supply-side PES attractive?

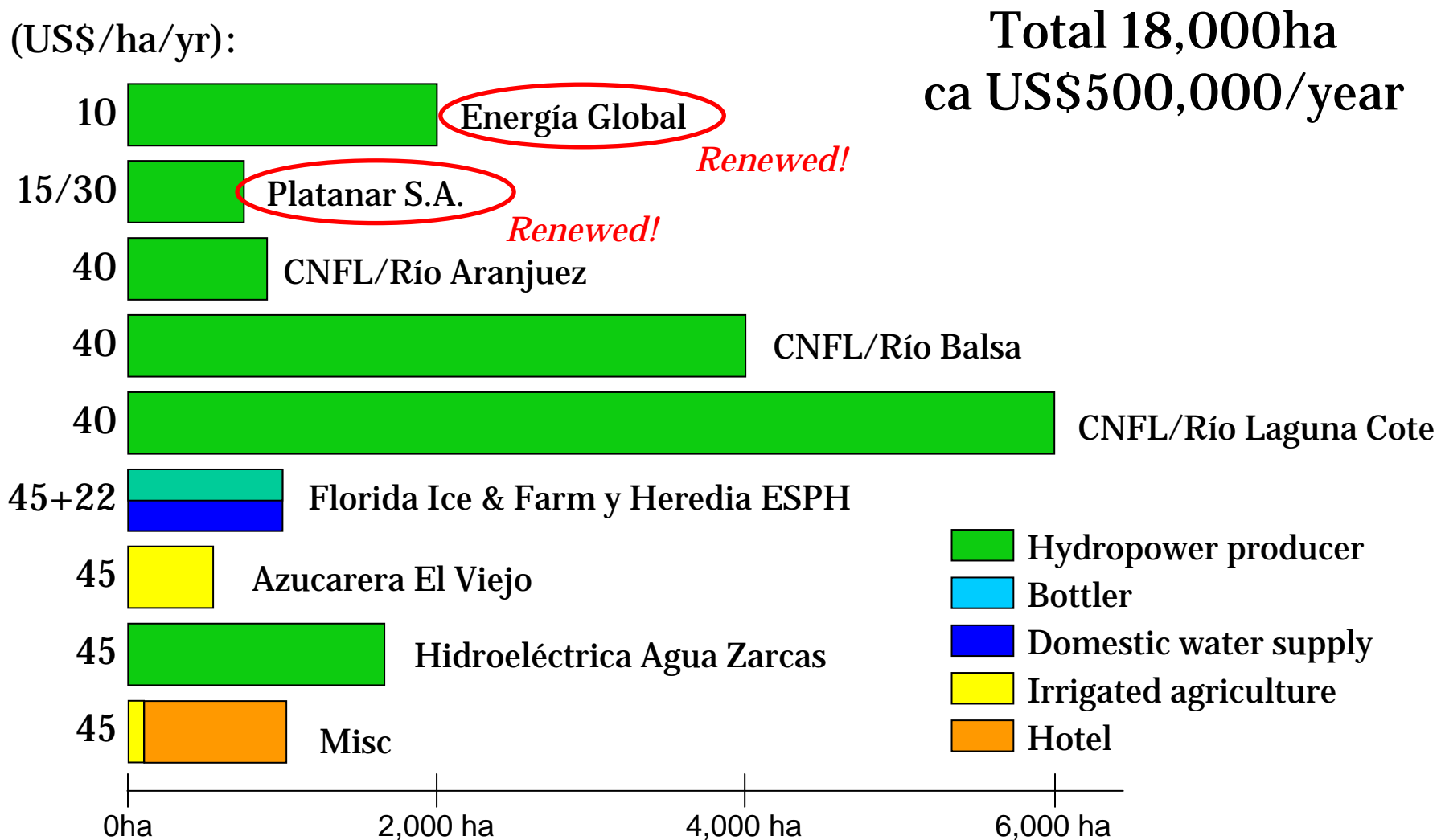
- ~~Generates its own financing:~~
 - Brings new financing not previously available for conservation
- ~~Efficient: ?~~
 - Focuses efforts where ~~benefits of conservation highest~~ and costs lowest
- ~~Potentially very sustainable:~~
 - Not based on whims of governments, donors, NGOs, but self-interest of service users and providers
- For this to work, need to:
 - Base payments to providers on payments by users
 - Actually deliver services: getting the science right is critical
 - Tailor mechanism to specific local conditions

Examples of PES mechanisms

- Using markets to preserve forests
- Colombia
 - Cauca Valley water user associations
 - Costa Rica
 - FONAFIFO/*Pagos por Servicios Ambientales (PSA)*
 - Heredia: Environmentally adjusted water tariff
 - Ecuador
 - Quito: FONAG ———— Capital city
 - Cuenca: ETAPA ———— Mid-size town
 - Pimampiro ———— Small rural town
 - El Salvador
 - Tacuba, San Francisco de Menéndez, Yamabal
 - Mexico
 - *Pago por Servicios Ambientales del Bosque (PSAB)*
 - Coatepec
 - Venezuela
 - CVG-Edelca payments for conservation of Río Caroní
 - South Africa
 - Working for Water Program: payments from Hermanus and George

Costa Rica: Payments by water users

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World Bank support to PES

Completed projects:

- **Costa Rica:** Ecomarkets Project (US\$33 million WB + US\$8 million GEF)

Projects under implementation:

- **Colombia/Costa Rica/Nicaragua:** Regional Integrated Silvopastoral Ecosystem Management Project (US\$4.5 million GEF)
- **South Africa:** Cape Action Plan for the Environment (US\$9 million GEF)
- **Mexico:** Environmental Services Project (US\$83 million WB + US\$15 million GEF)
- **Costa Rica:** Mainstreaming Market-Based Instruments for Environmental Management Project (US\$30 million WB + US\$10 million GEF)

Projects under preparation:

- **Brazil:** Forests for Life Project
- **Colombia:** Sustainable Livestock Management Project
- **Ecuador:** Management of Chimborazo's Natural Resources Project
- **Venezuela:** Canaima National Park Project
- **Kenya:** Agricultural Productivity and Sustainable Land Management Project
- **Worldwide:** LULUCF carbon projects (US\$30 million BioCarbon Fund)

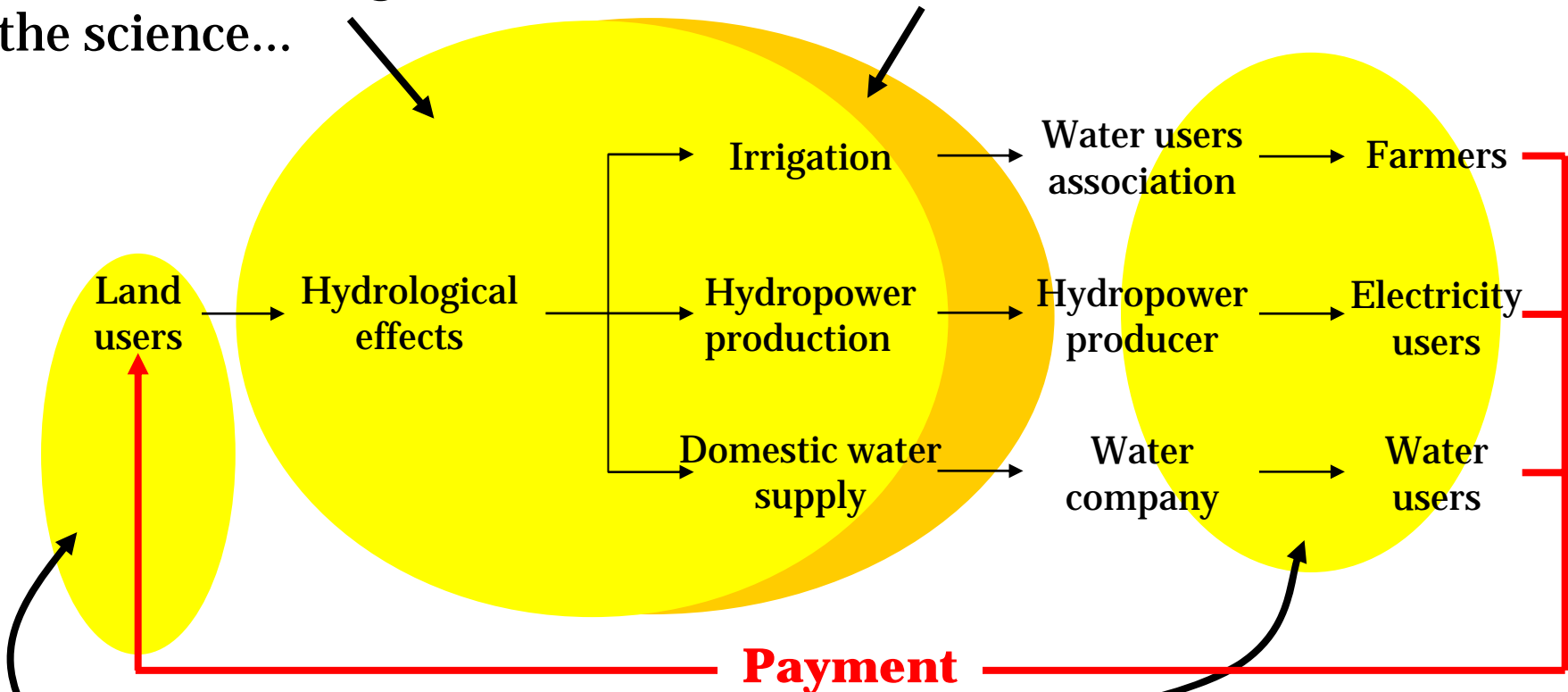
Capacity building: Courses in Colombia, Dominican Republic, Ecuador, El Salvador, Kenya, Mexico, Panama, Peru, Senegal, South Africa, Venezuela

Research: Case studies; Hydrological aspects; Poverty links; Valuation

From theory to practice

1. Understanding the science...

... and the economics



2. Charging service users

3. Paying service providers

4. Establishing the institutional framework

Water services: key characteristic

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Water flows downhill

Water services vary substantially

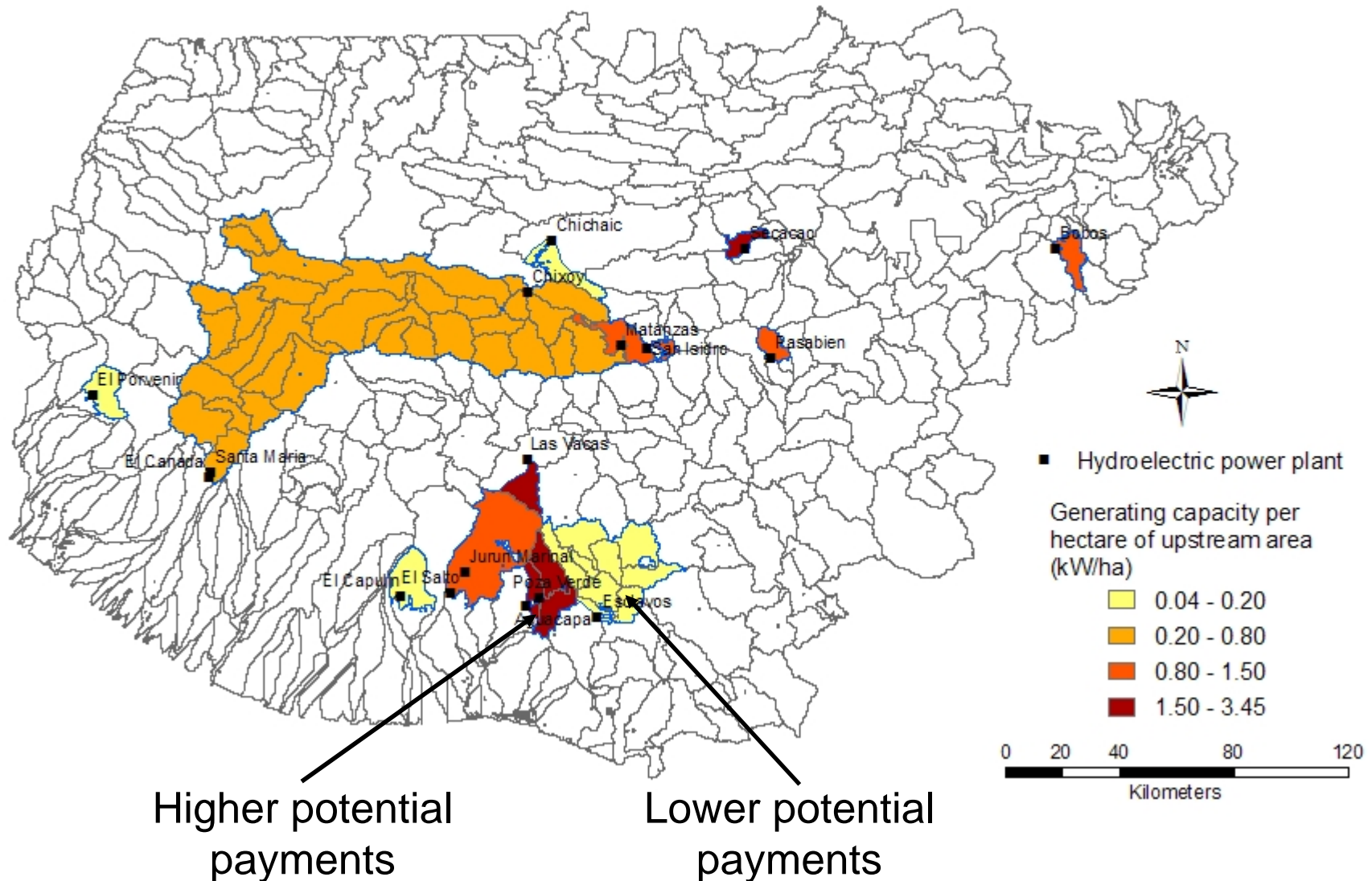
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Where are the services?

Guatemala: Watersheds with hydropower plants

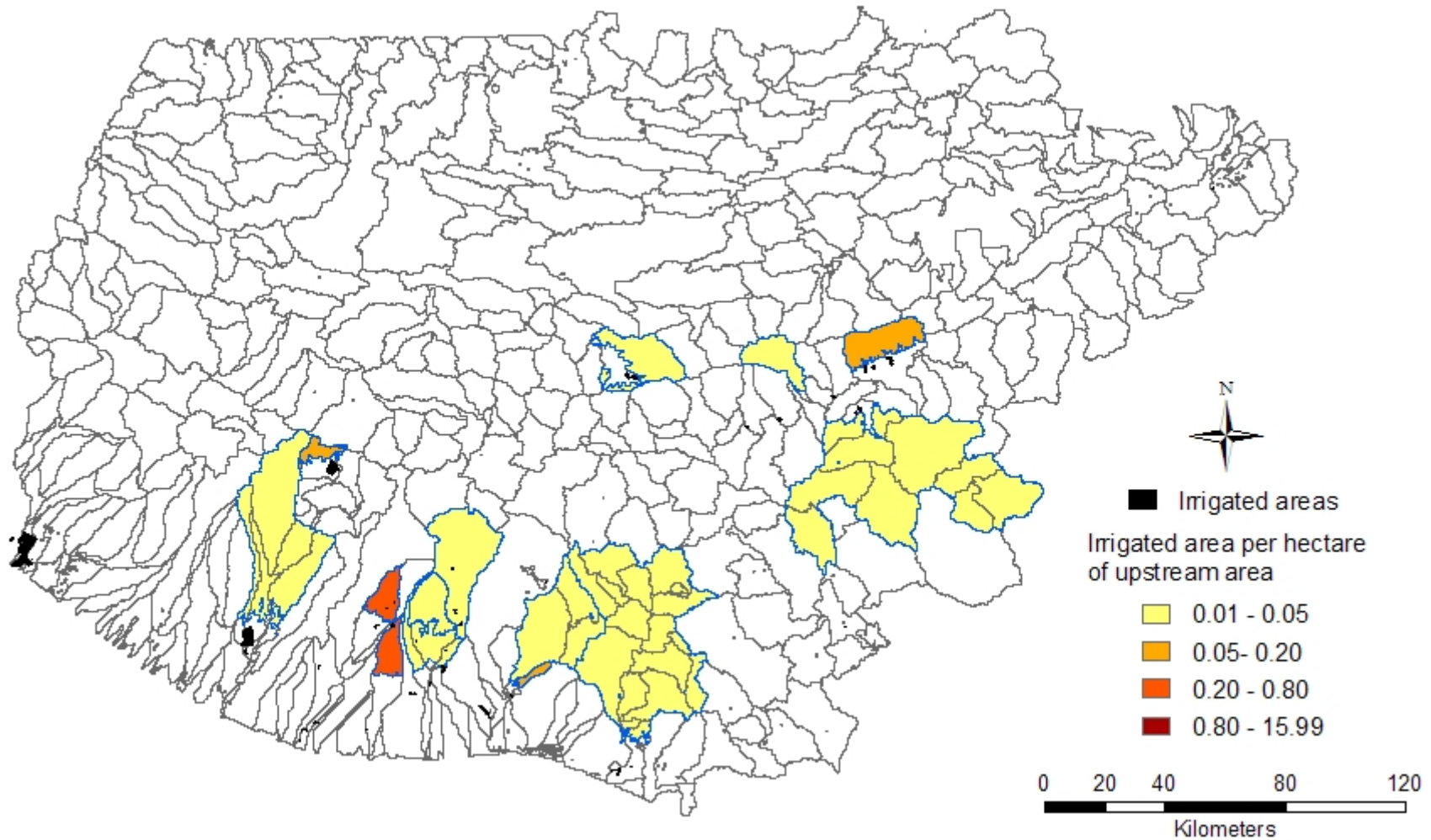
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Source: Pagiola, Zhang, and Colom, 2007

Where are the services?

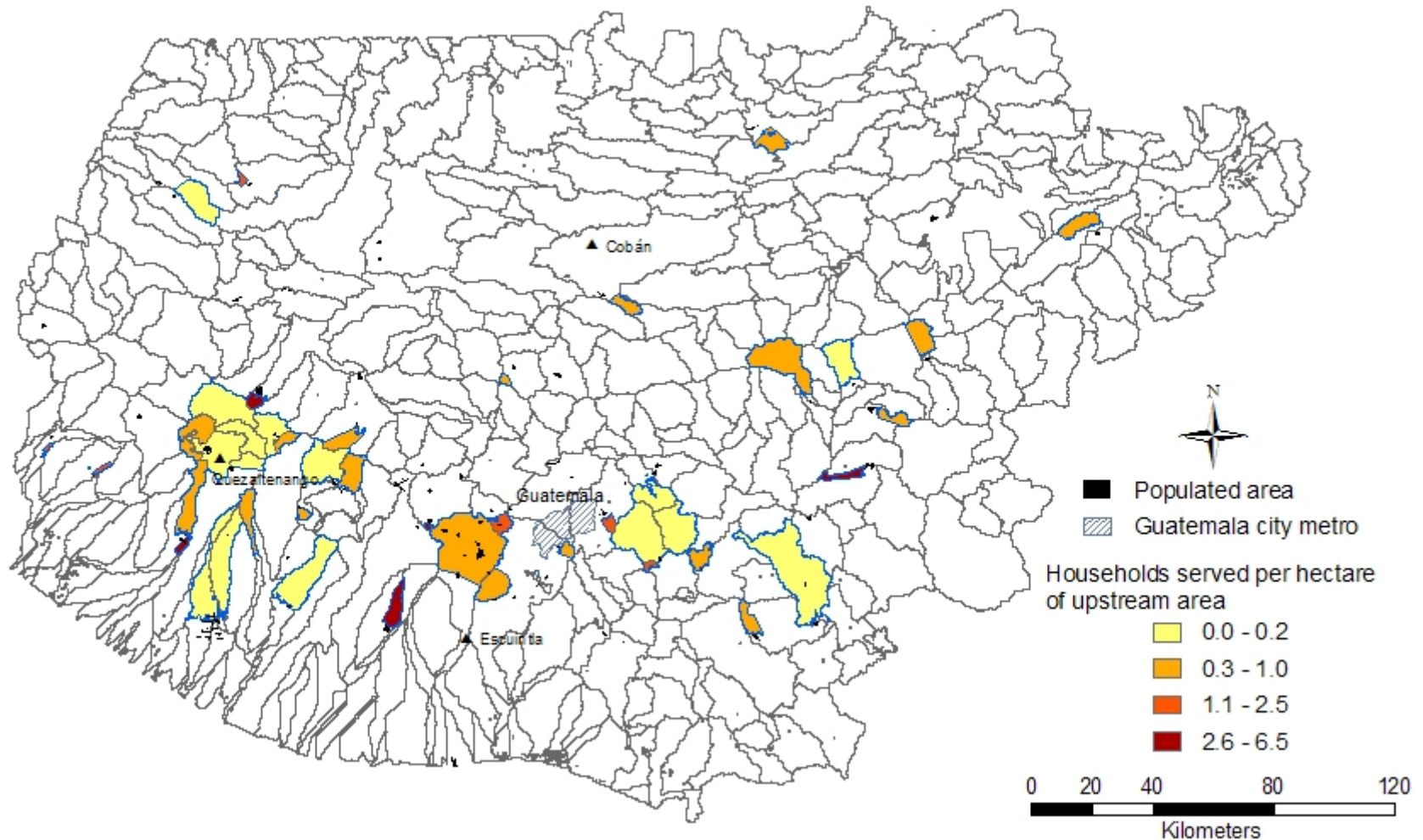
Guatemala: Watersheds with irrigation (>500ha)



Where are the services?

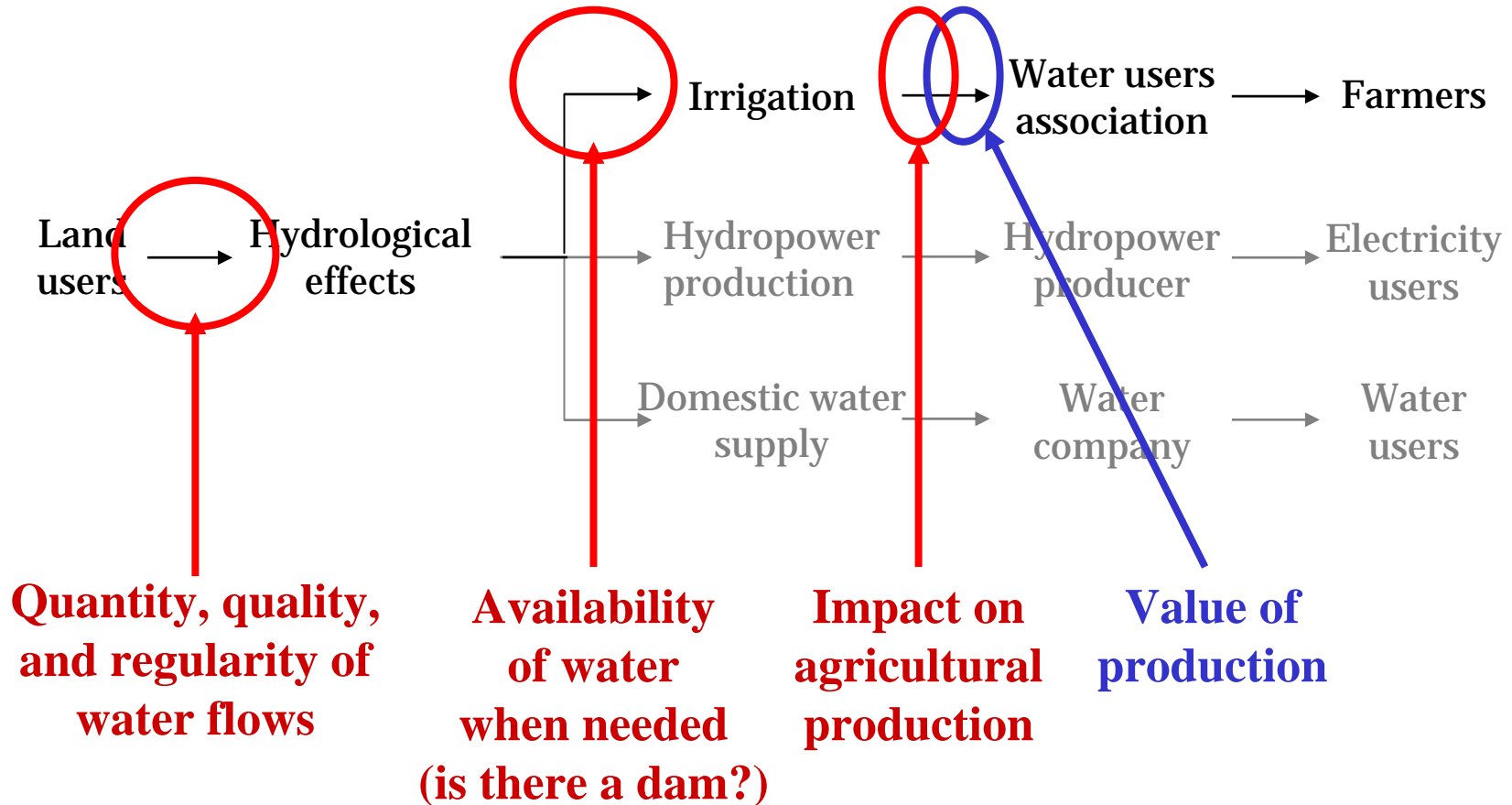
Guatemala: Watersheds with significant domestic water use

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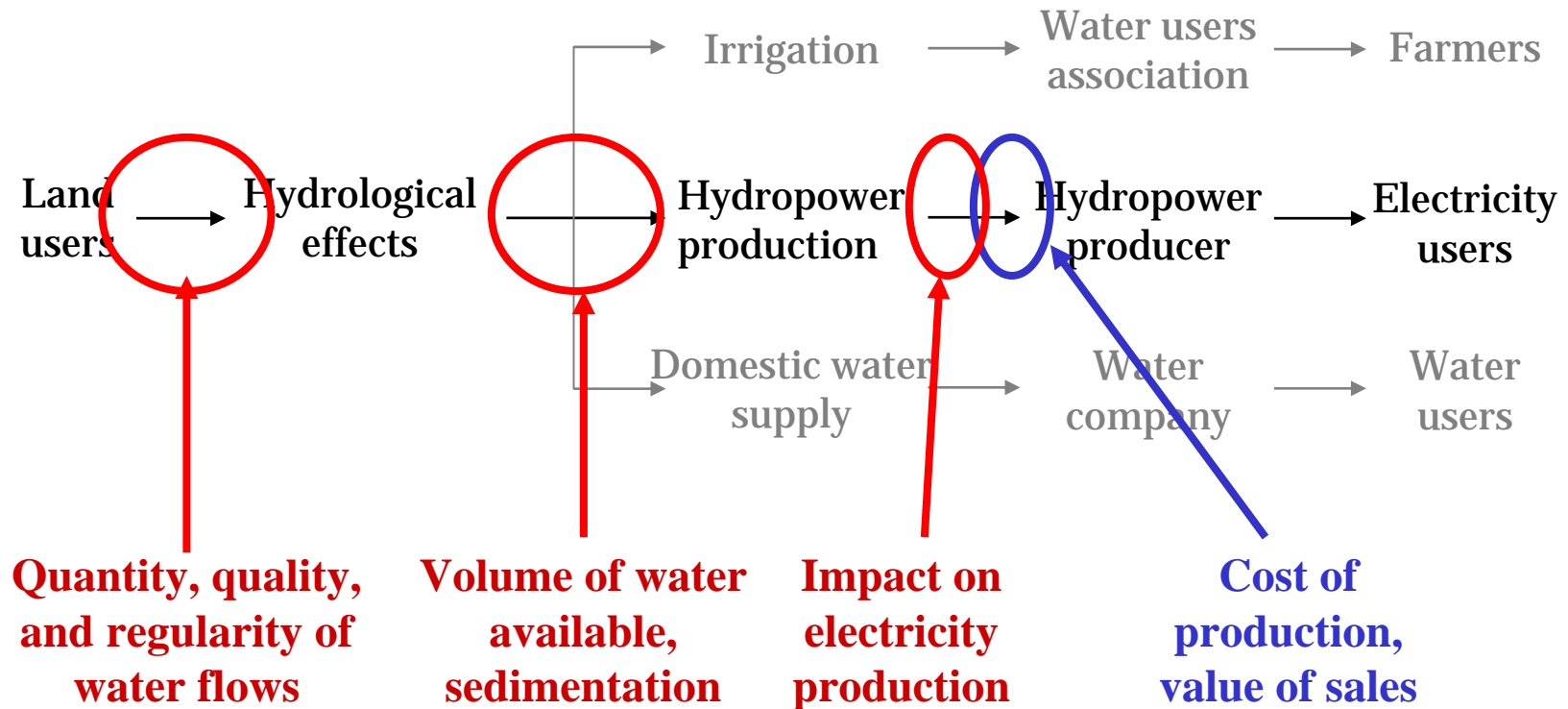
Identification and quantification of water services

Need to understand chain of cause and effect



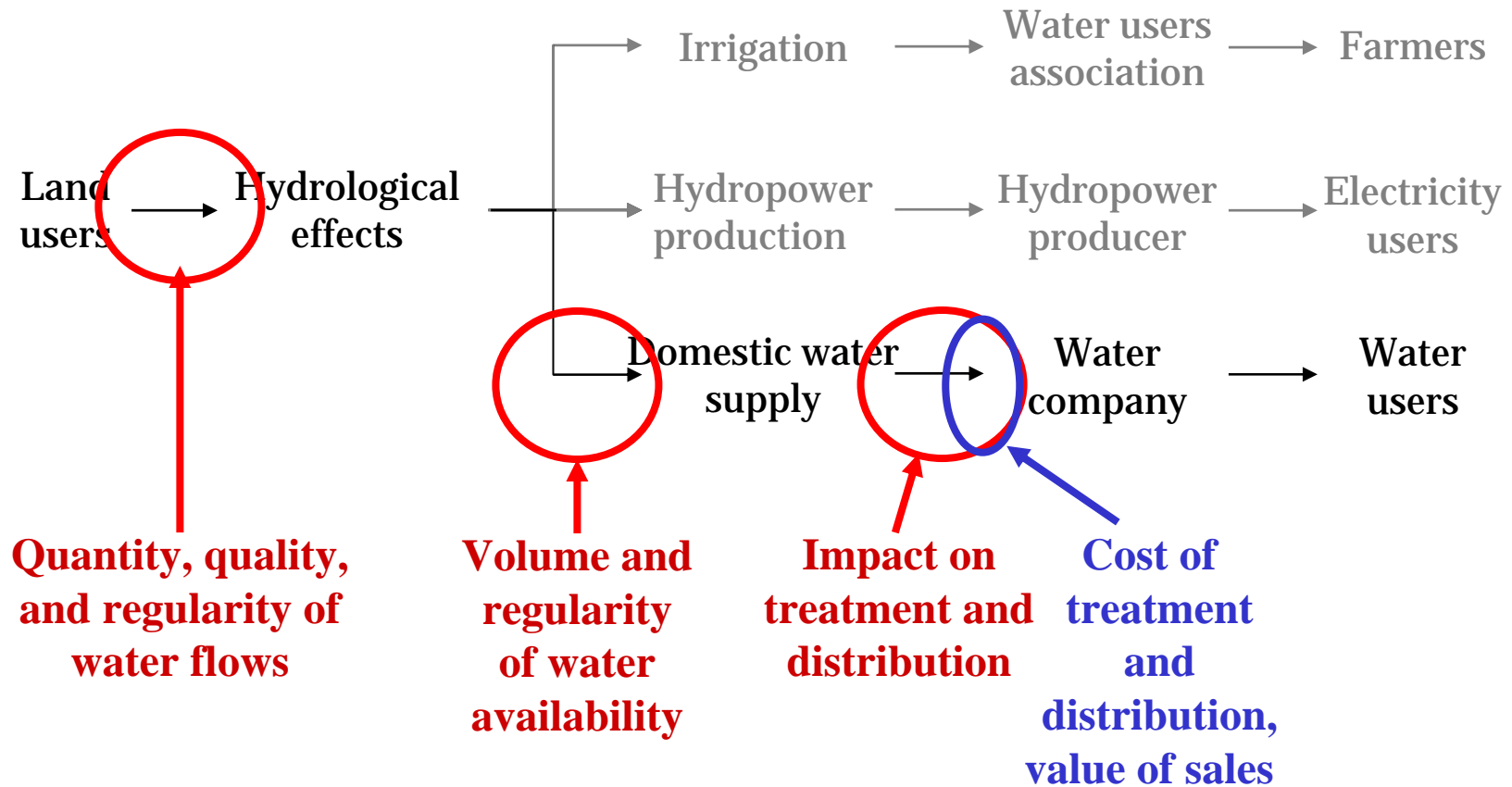
Identification and quantification of water services

Need to understand chain of cause and effect



Identification and quantification of water services

Need to understand chain of cause and effect



Links between forests and water services: Myths and reality

Myth: Forests increase precipitation

Reality: Minor effect, except at continental scale

Myth: Forests slow runoff

Reality: True

Myth: Forests increase total annual water flow

Reality: Because of increased evapotranspiration, forests usually *reduce* total annual water flow.

Exception: Cloud forests

Myth: Forests increase water flow in the dry season

Reality: Unclear

Myth: Forests reduce flooding

Reality: True at small scales, not at large scales

Myth: Forests reduce erosion

Reality: Depends on use that is made of deforested areas

Important: *Relevant comparison is not forest vs non-forest but forest vs specific alternatives*

Links between forests and water services: How much do we know?

<i>Service</i>	<i>Qualitative understanding</i>	<i>Ability to quantify</i>
Total water quantity	Good	Medium
Dry season water flow	Poor	Poor
Flood risk	Medium	Poor
Water quality	Good	Poor
Sediment loads	Good	Medium/high

Charging service providers: Sasumua Water Treatment Plant

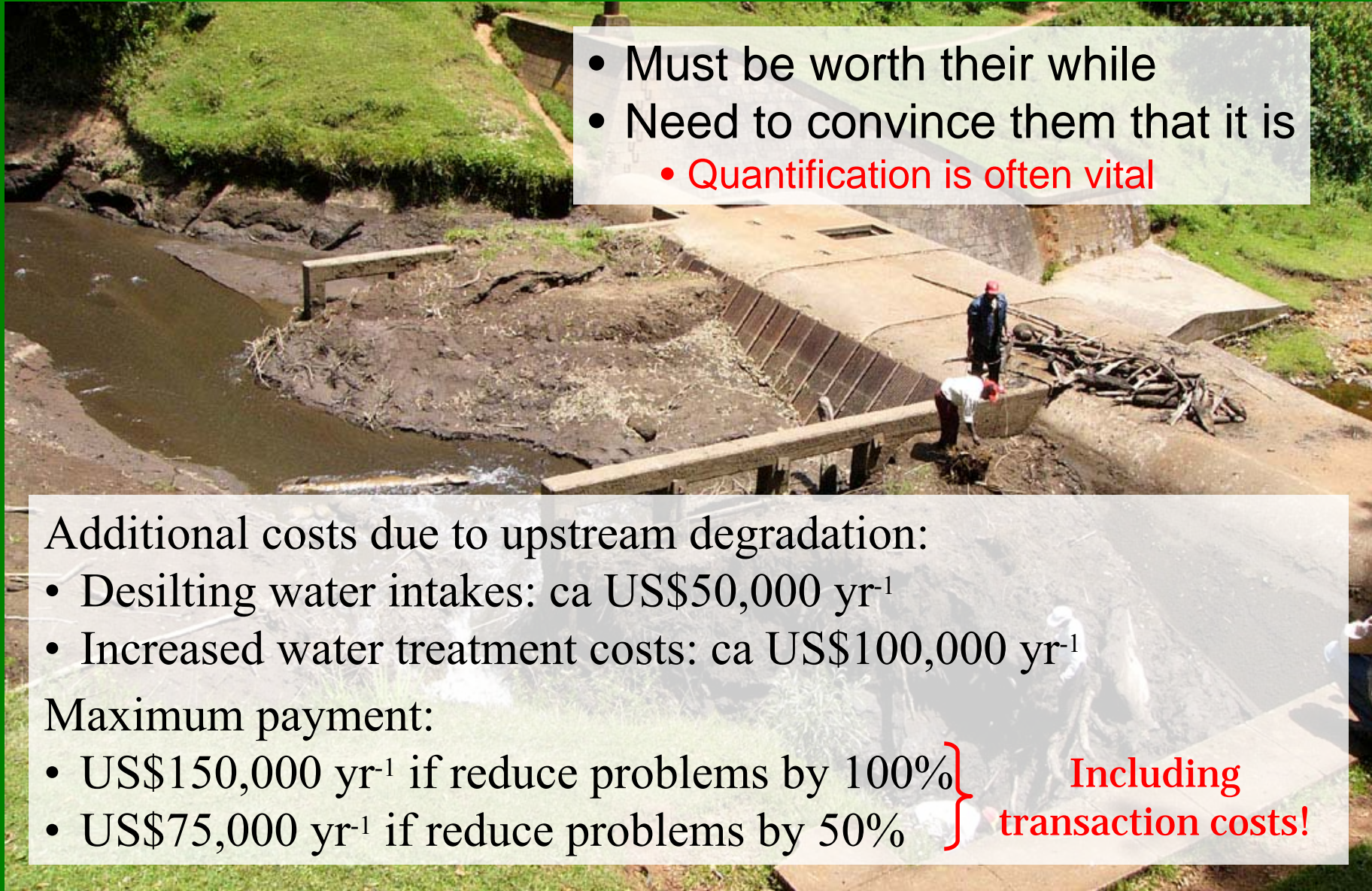
- Must be worth their while
- Need to convince them that it is
 - Quantification is often vital

Additional costs due to upstream degradation:

- Desilting water intakes: ca US\$50,000 yr⁻¹
- Increased water treatment costs: ca US\$100,000 yr⁻¹

Maximum payment:

- US\$150,000 yr⁻¹ if reduce problems by 100%
 - US\$75,000 yr⁻¹ if reduce problems by 50%
- Including transaction costs!**



Charging service users

Easiest when beneficiaries

- Are easy to identify
- Receive well-defined benefits
- Are already organized
 - Easier to negotiate agreements
 - Already have payment mechanisms
- Are few

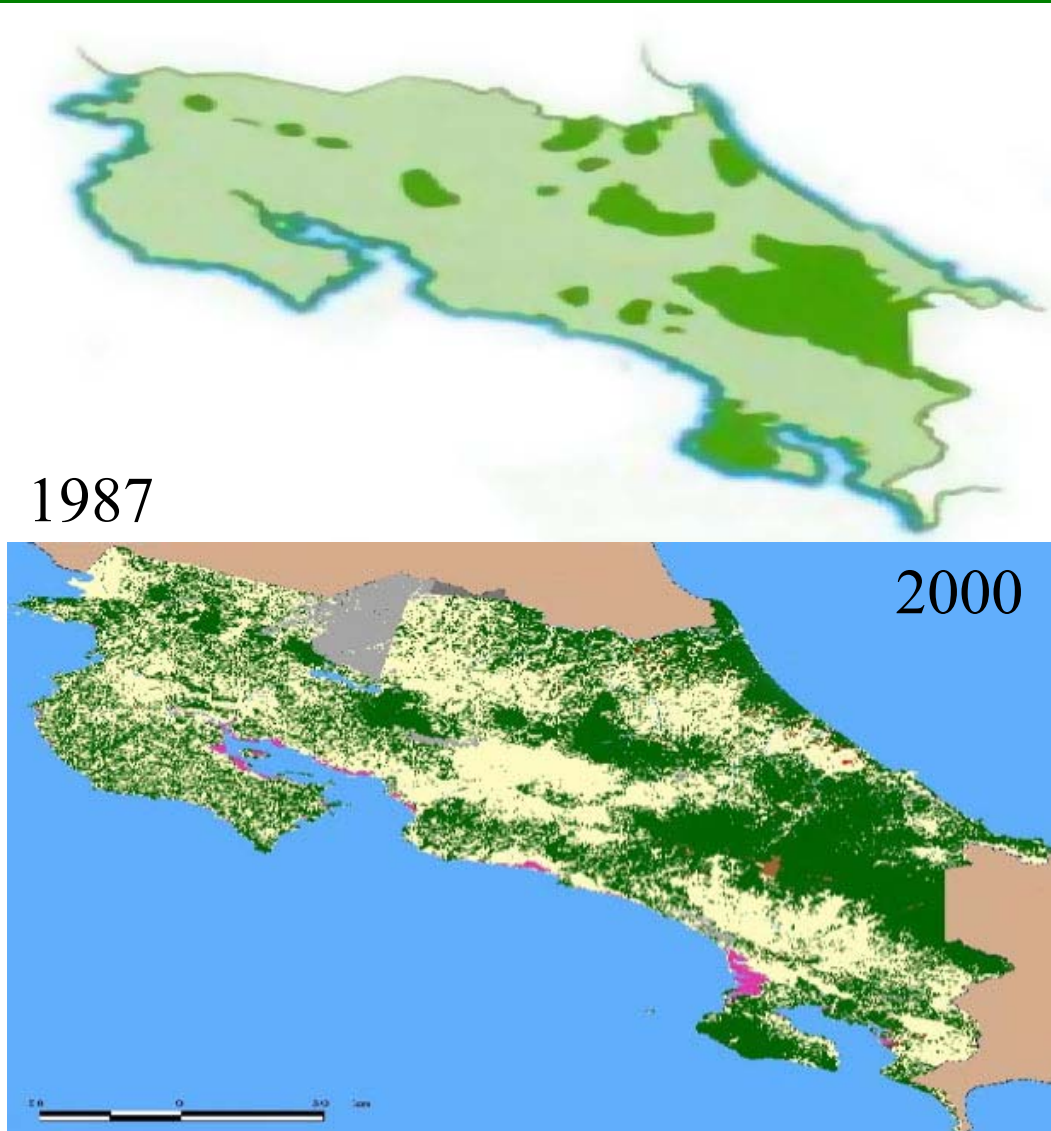
Who's going to pay?

<i>Are service users...</i>	<i>Water services</i>	<i>Biodiversity services</i>
Easy to identify?	√	X
Receive well-defined benefits?	√	X
Already organized?	√	X
Few?	√	X

Main problems to establishing PES mechanisms

- Getting the science right
- Getting the institutions right

Costa Rica: A happy ending



- Distortions reduced
- Changes in legal framework
- Wide array of market-based instruments
 - Ecotourism
 - Certification
 - Payments for environmental services

For more information

www.worldbank.org/environmentaleconomics