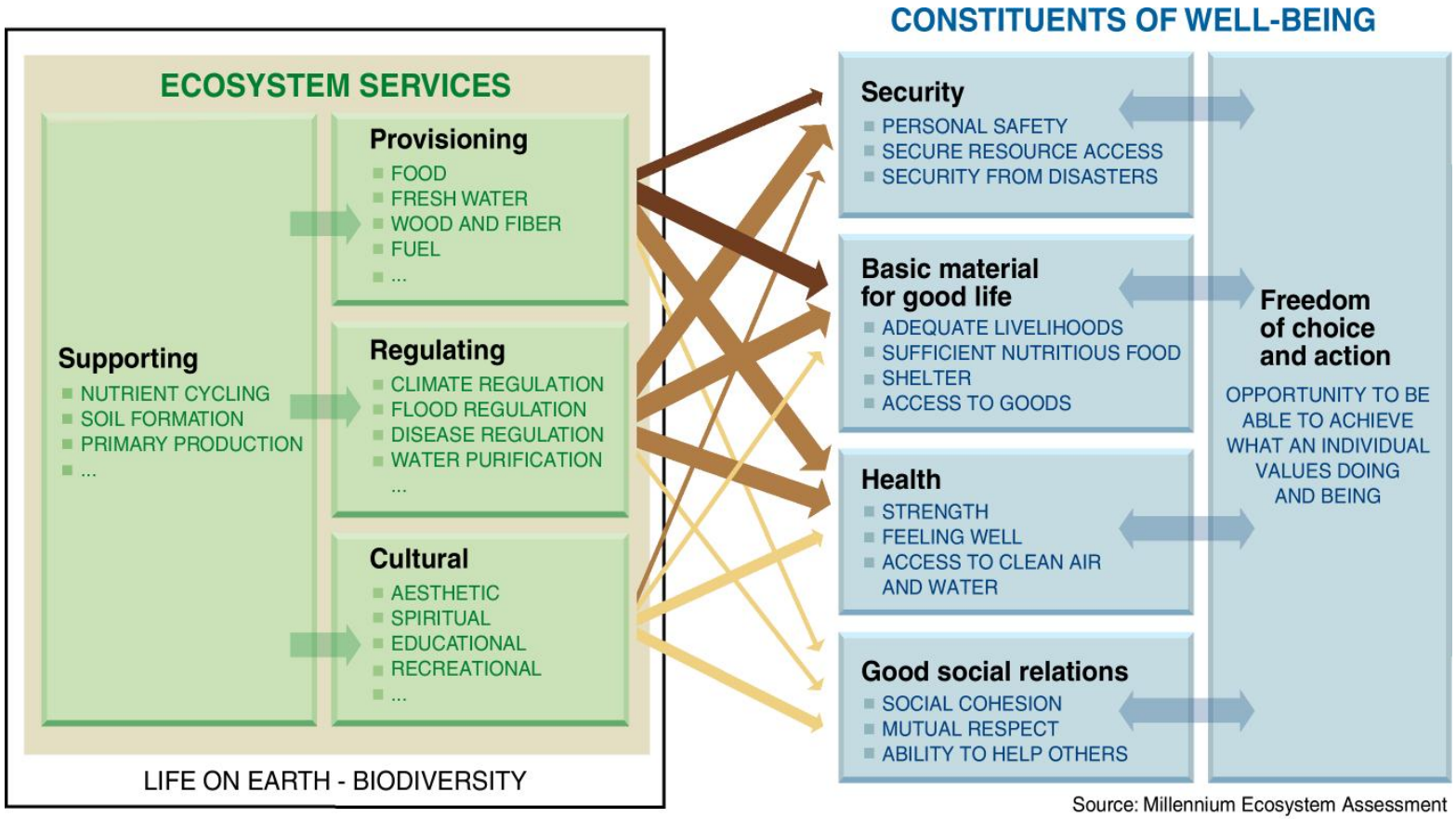
Ecosystem services and human well-being



Source: Millennium Ecosystem Assessment

Why value ecosystems?

1. **Awareness raising**
   - **–Willingness-to-pay for environmental amenities**
   - **–Welfare loss due to environmental degradation**
   - **–Opportunity cost of environmental protection**

Example:

A meta-analysis of wetland valuation studies reports a median value of US$170 per hectare per year based on 89 studies covering 63 million ha. This is extrapolated to US$70 billion per year for a global wetland area of 12.8 million km2. The highest values were recreational opportunities and amenities, flood control and storm buffering.

Source: Schuyt, K. and Brander, L. 2004. *The Economic Values of the World's Wetlands*. WWF-International and the Institute for Environmental Studies, Vrije Universiteit, Gland/Amsterdam (January).

Why value ecosystems? (continued)

2. Resource allocation

- Land use decisions
- Resource pricing (e.g. park entry fees)
- Fiscal reform (perverse subsidies)
- Payments for ecosystem services

Example:

The costs of reducing non-point water pollution in the Catskill-Delaware watershed (serving New York City) were less than the cost of installing new filtration capacity. The latter was estimated at US$4 to 6 billion investment, plus $250 million annual operating costs, compared to $1 billion for integrated resource management to provide the same benefits through land purchases, regulatory reform, stakeholder dialogue, and payments for farm-level pollution control (e.g. manure disposal).

Source: Appleton, A.F. 2002. “How New York City Used an Ecosystem Services Strategy Carried out through an Urban-Rural Partnership to Preserve the Pristine Quality of Its Drinking Water and Save Billions of Dollars”, paper presented at Katoomba V, November 2002, Tokyo, Japan.

Why value ecosystems? (continued)

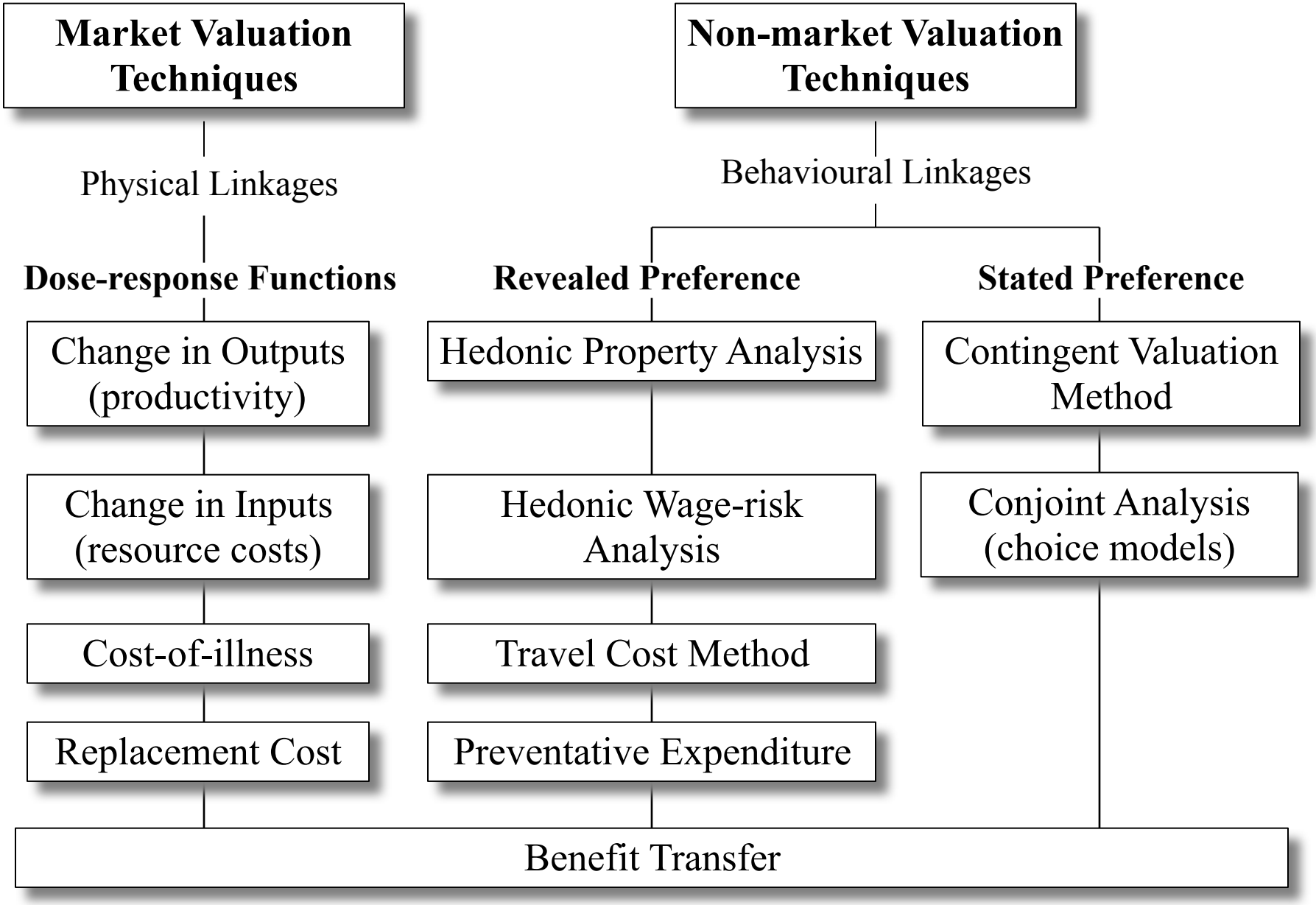
3. Equitable sharing of costs and benefits

Distribution of Net Present Value among stakeholders of Leuser National Park

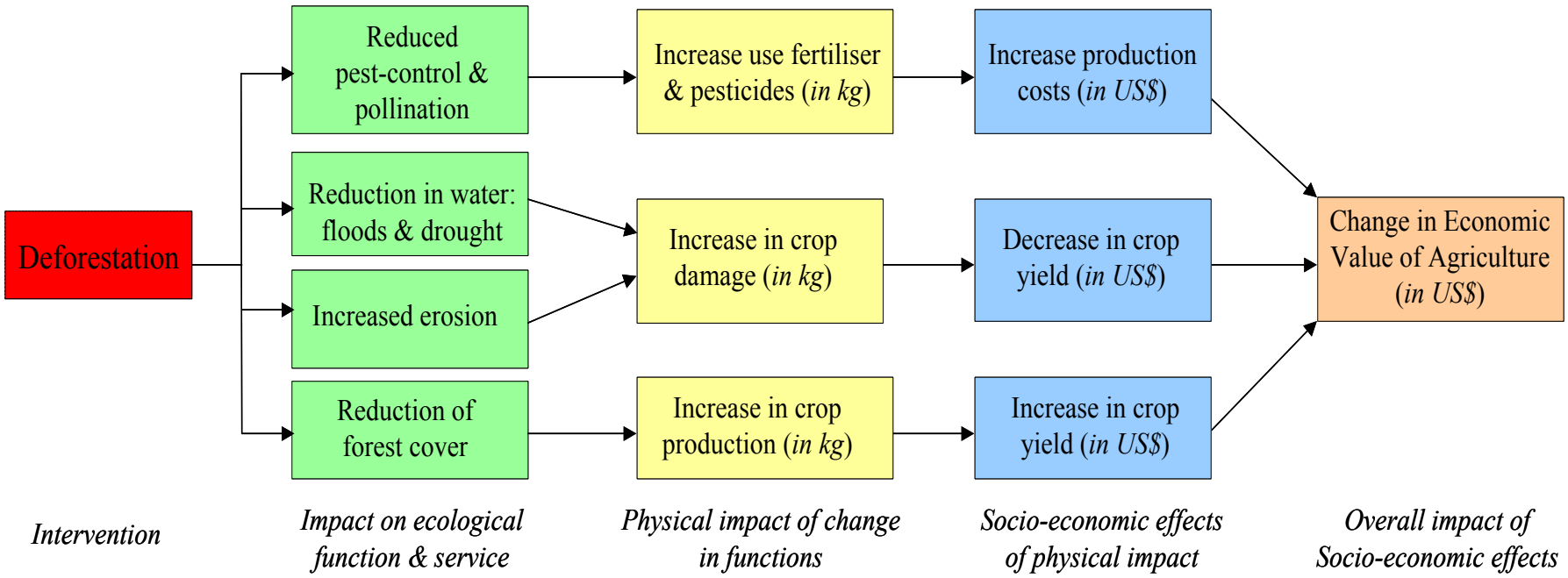
Scenario	NPV (*million US$)*	Local Community	Local Government	Elite Industry	National government	International community
Deforestation	6,958	45%	11%	23%	7%	13%
Conservation	9,538	56%	9%	11%	5%	19%
Selective use	9,100	53%	10%	14%	5%	18%

Note: NPV over the period 2000-2030 at a discount rate of 4%

Source: van Beukering, Pieter. 2003. "The economic value of tropical forest and its consequences for setting up payment schemes for environmental services: A comparison between the Leuser National Park (Indonesia) and the Iwokrama Forest (Guyana)" paper presented at the Congress on *Globalisation, localisation and tropical forest management in the 21st century*, 22-23 October 2003, Roeterseiland, Amsterdam, the Netherlands.



Valuing change in economic output
(dose-response functions)

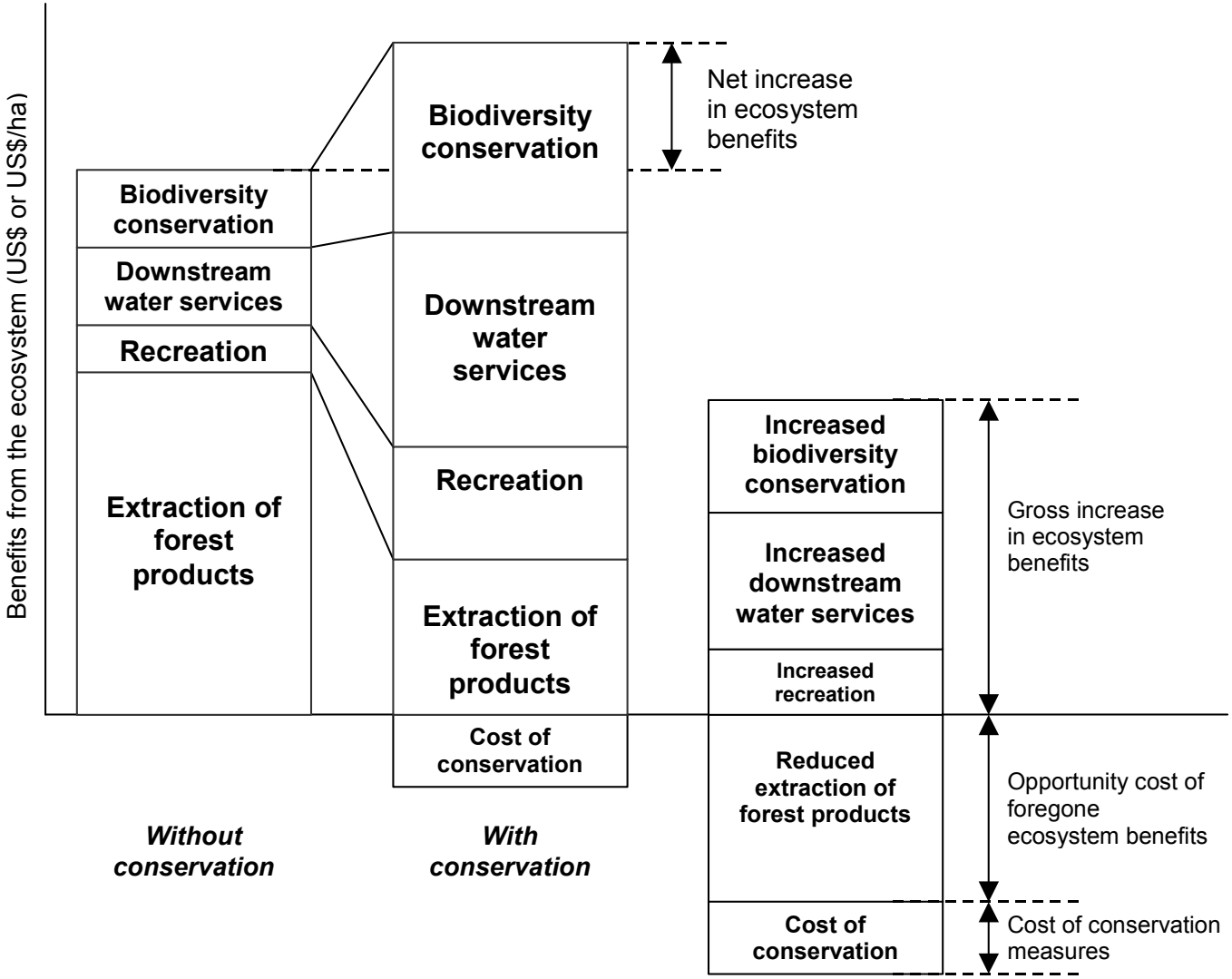


Valuing forests in Europe (stated preference)

Author	Country (sample)	Benefit	Value (Euros per annum)
Dubgaard (1998)	Denmark (n=1420)	Forest recreation (annual pass)	€ 18 (mean WTP) € 70 million (total population)
Horton et al. (2002)	UK and Italy (n=407)	Creation of parks in the Amazon	€ 48 - € 63 per HH (5 to 20%) € 1 billion in the UK and "a similar amount" in Italy
Huhtala (2002)	Finland (n=1871)	Recreational use of national parks	€ 19 (mean WTP) € 75 million (total population)
Reira Font (2000)	Mallorca, Spain (n=1805)	Tourist visits to protected areas (option value)	€ 181 million
Scarpa et al. (2000)	Ireland (n=8371)	Create nature reserves in forests currently lacking	€ 725,000 for 26 sites

Adapted from: EFTEC. 2002. *Populating the Environmental Valuation Reference Inventory: 40 European valuation studies*. Final report submitted to European Commission, DG Environment.

Total economic value of conservation



Source: Pagiola et al. (2004)

Lessons and challenges of valuation

Methods are adequate but data is lacking

- Most studies are site-specific, focus on a single good or service at one point in time, and assume fixed prices.
- Most studies focus on the direct use values of marketed products, for which data can be obtained more easily.
- Ecosystem services are rarely or unreliably valued, due to poor data on biophysical relationships.
- Non-use values are difficult to define, tricky to estimate and even harder to capture, due to free-riding and a lack of accepted transfer mechanisms.

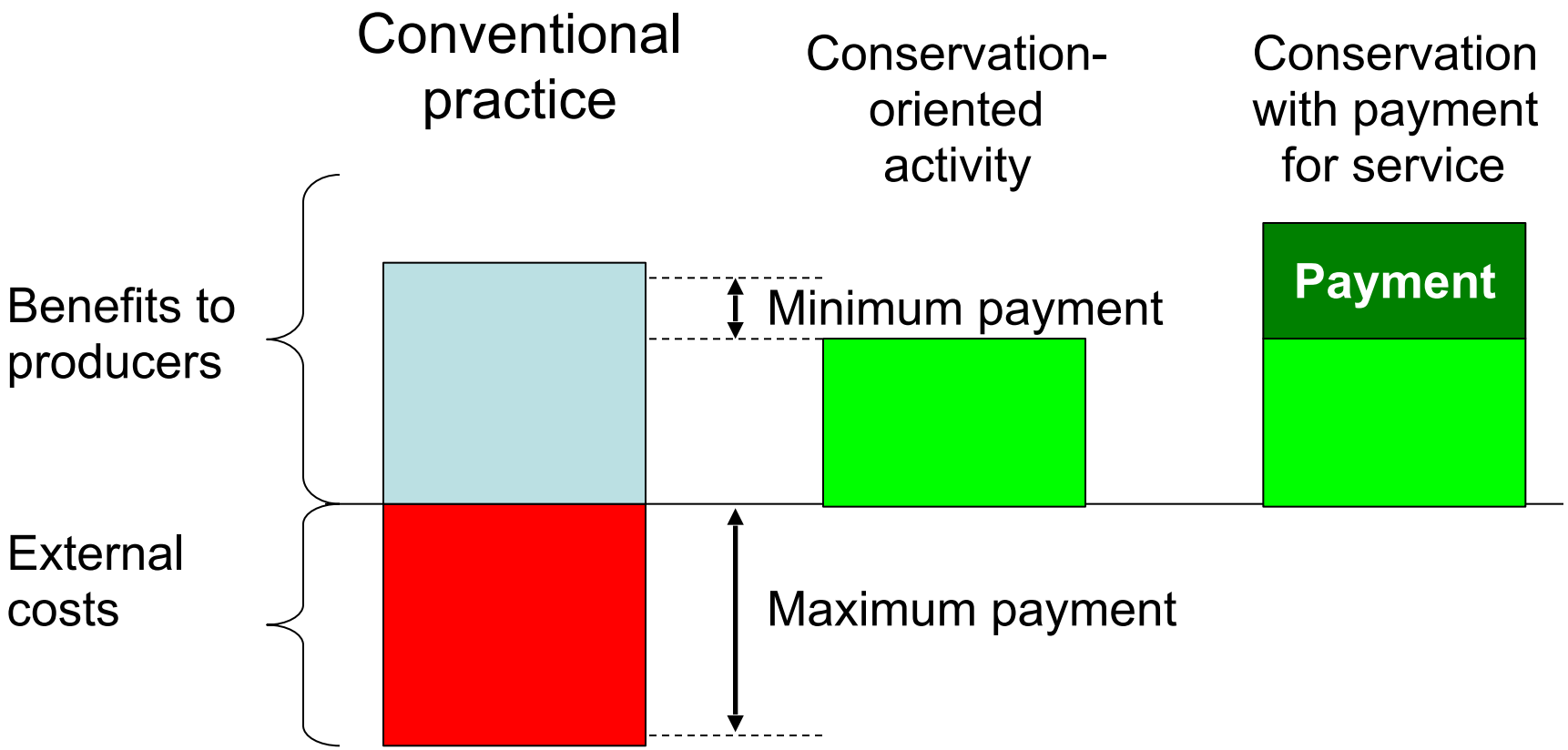
The way forward…

- More routine valuation by governments (as part of normal statistical work)
- Better bio-physical data on contribution of ecosystem services to market production
- Reform of subsidies (agriculture, water)
- Liability for ecological damage
- Payment for ecosystem services

Payments for watershed protection are increasingly common

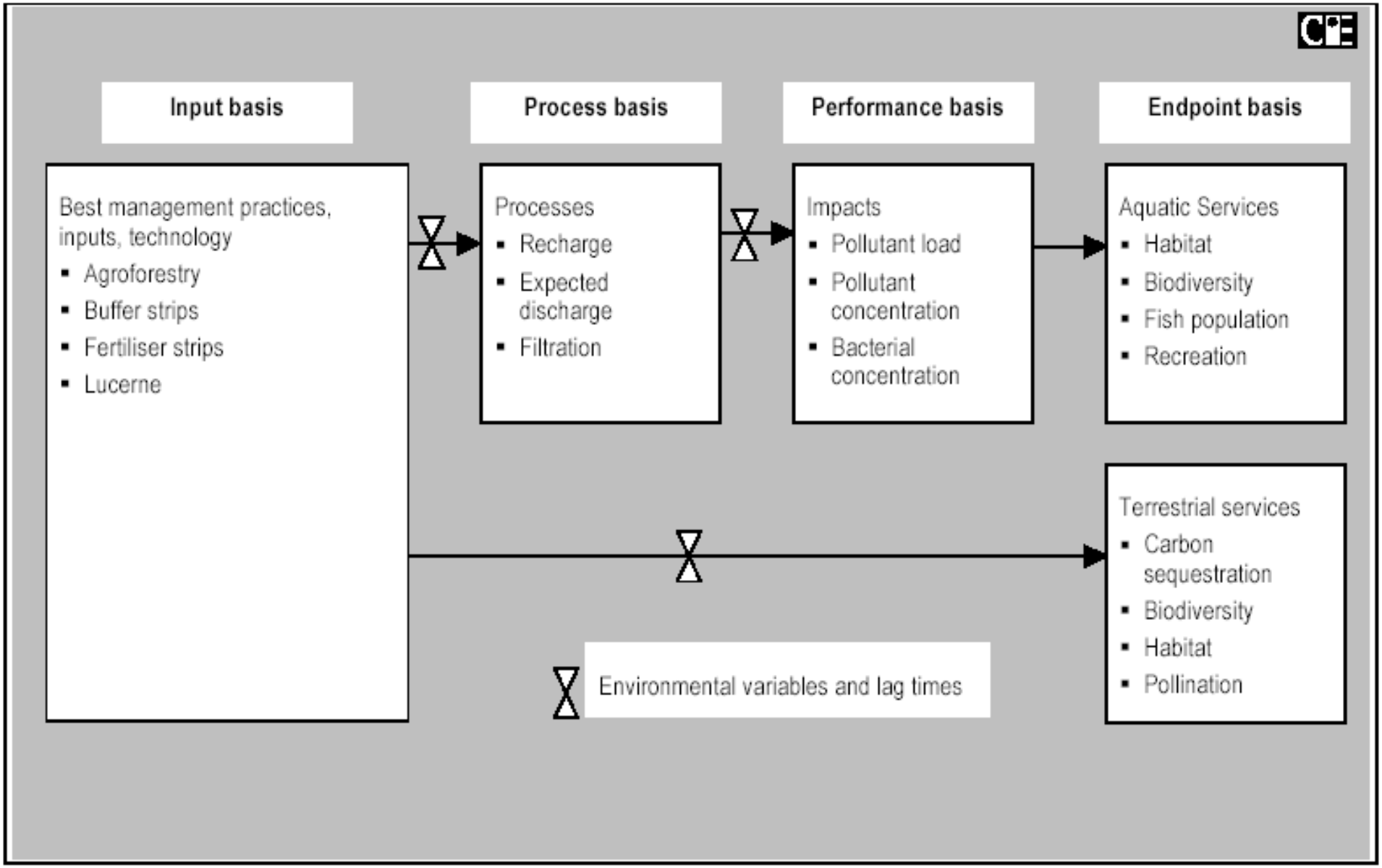
- **Brazil** – A water utility in the city of Sao Paulo pays 1% of total revenues for the restoration and conservation of the Corumbatai watershed. Funds are used to establish tree nurseries and for reforestation along riverbanks.
- **China** – Water and hydroelectric companies pay 0.01 Yuan per tonne of water, and 0.005 Yuan per Kilowatt of electricity, to farmers who plant and manage trees to maintain dry season flows and improve water quality.
- **Ecuador** – Municipal water companies in Quito, Cuenca and Pimampiro impose levies on water sales. Revenues are invested in conservation upstream and payments to forest owners.

Payments for ecosystem services: Easy in theory; hard in practice



Source: World Bank 2002

What is the basis for payments?
(after van Bueren 2001)



Payments for ecosystem services are appropriate when…

- Buying the resource outright is too expensive (and unnecessary)
- Payments are less expensive than alternative technical fixes (e.g. infrastructure)
- Provision of the desired service is verifiable and enforceable
- Transaction costs are not prohibitive
- Someone is willing to pay the price

Source: Kousky, C. 2005. *Choosing from the Policy Toolbox*, http://ecosystemmarketplace.net/ accessed on 5.12.2005.

Environmental liability and compensation

The mitigation hierarchy:

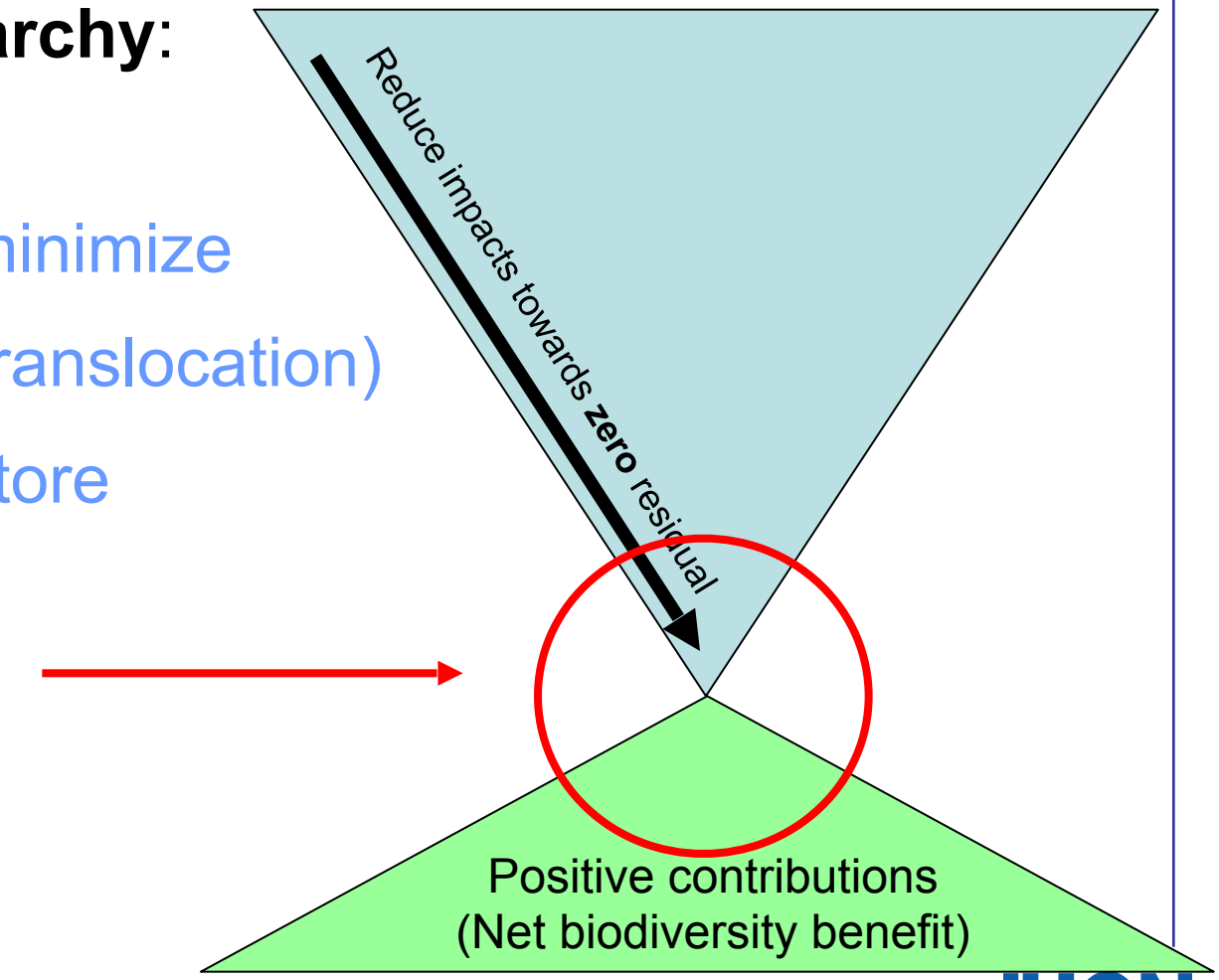
Avoid

Reduce, moderate, minimize

Rescue (relocation, translocation)

Repair, reinstate, restore

Compensate/offset



But first reform perverse subsidies!

Type of subsidy	Channel for environmental harm	Impact on environment
Agricultural price supports	Incentives for farmers to grow water-inefficient crops.	Salinization, water-logging and/or decline in groundwater (GW) tables leading to changes in local ecosystems.
Surface water price	Overuse of water. Use of inappropriate technologies.	Pollution and depletion of water bodies leading to habitat destruction. Salinization and water-flow problems.
Electricity price	Substitution of surface water (SW) with GW. Overuse of GW due to excessive pumping.	GW levels are lowered and aquifers are depleted. Ecosystems altered by loss of water.
Pesticide prices	Overuse of pesticides and inefficient application leading to leaching.	Pesticides contaminate GW aquifers and impact ecosystems.
Fertilizer prices	Overuse of fertilizer and inefficient application leading to fertilizer leaching.	Fertilizers can increase soil salinity and contaminate GW aquifers, impacting ecosystems.

OECD (2002)