GLOC-2, Montego Bay, 3 October 2013

HUMAN IMPACTS OF THE NITROGEN AND PHOSPHORUS CYCLES

A water security perspective

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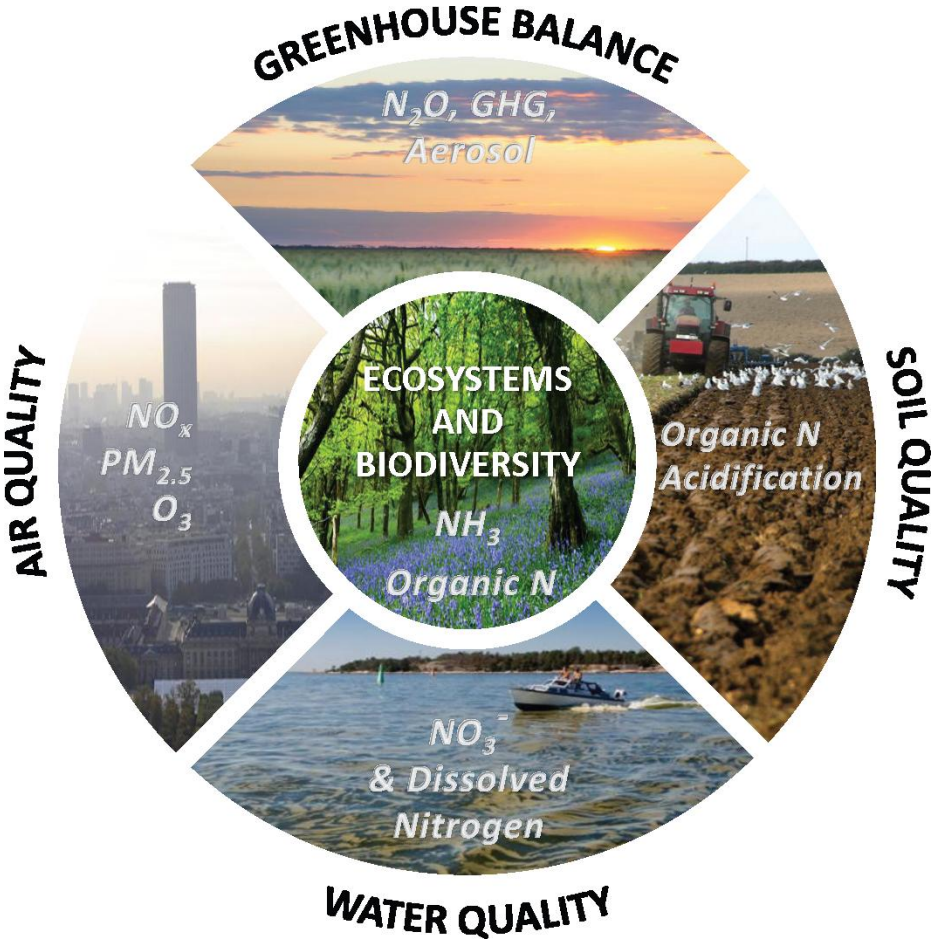
Why does nitrogen matter?



European Nitrogen Assessment (2011)

What is water security?

- Water security is about establishing an acceptable level of water risk for four risks:
  - Risk of shortage
  - Risk of inadequate quality
  - Risk of excess
  - Risk to freshwater systems (resilience)

Improving water security




NUTRIENTS

Get the math right

N cascade			River N exports to coastal waters
agriculture (fertilisers)	63	34	agriculture (surplus)
biological fixation by plants	24	58	N deposition and biological fixation
energy and transport	13	8	urban wastewater
Total	100	100	

European Nitrogen Assessment (2011) *OECD Environmental Outlook (2008)*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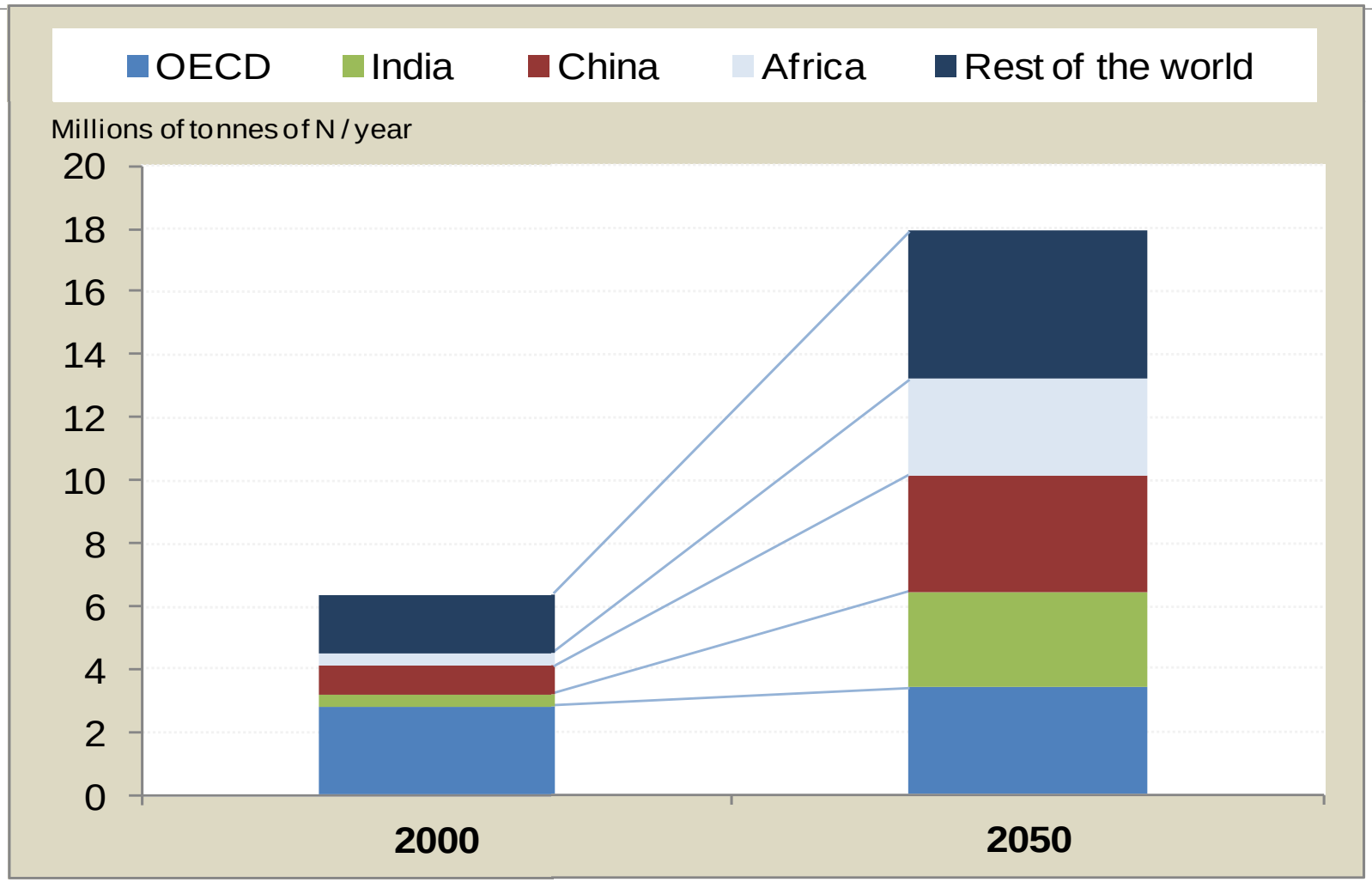
Nitrogen effluents from wastewater



Get the math right > 2030

N cascade			River N exports to coastal waters
agriculture (fertilisers)	63	34 > 43	agriculture (surplus)
biological fixation by plants	24	58 > 45	N deposition and biological fixation
energy and transport	13	8 > 11	urban wastewater
Total	100	100	53 > 55 million tonnes
European Nitrogen Assessment			*OECD Environmental Outlook (2008)*

WATER SECURITY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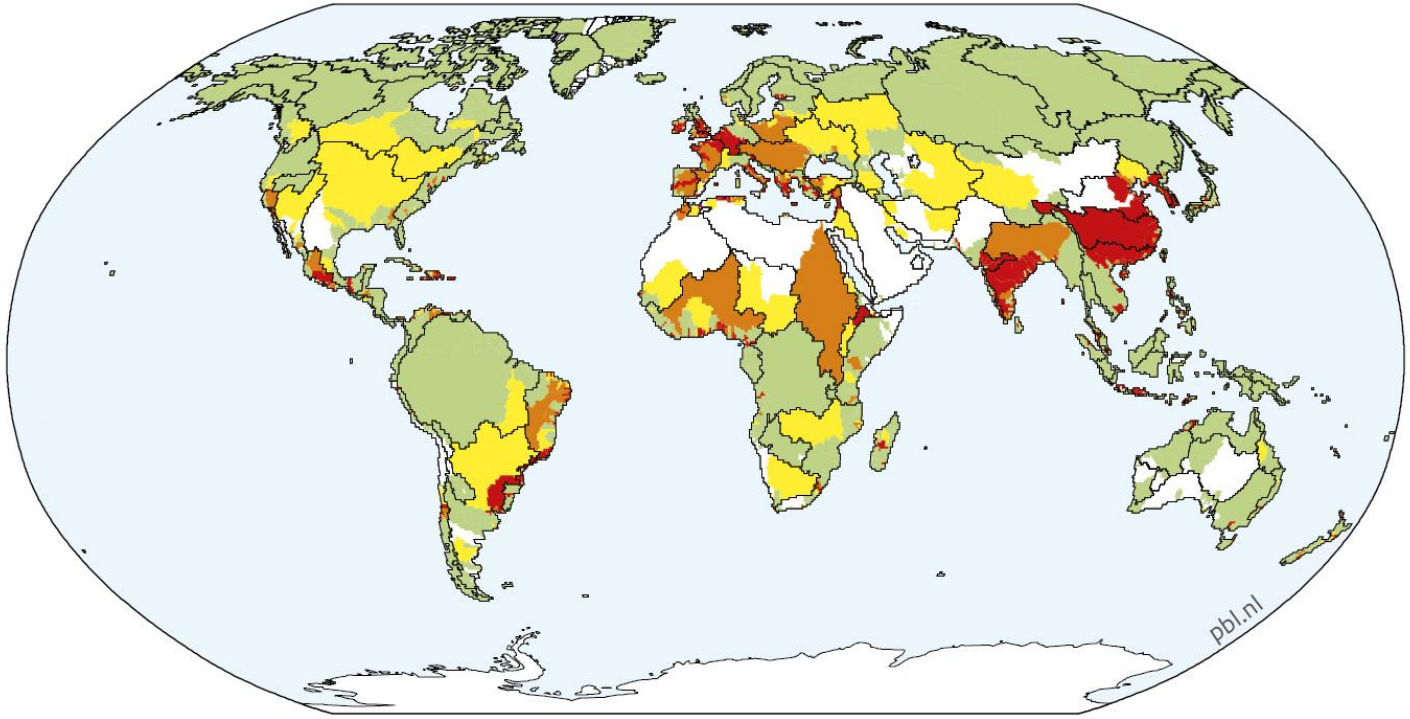
Example of water insecurity >> eutrophication

- Direct discharges of N and P to inland and coastal waters
  - NO_3 from agriculture
  - NO_3 from urban wastewater
- Air pollution (eutrophying deposition):
  - NOx from the burning of fossil fuels at high temperatures (industry, energy, transport)
  - NH_3 (ammonia) from agriculture

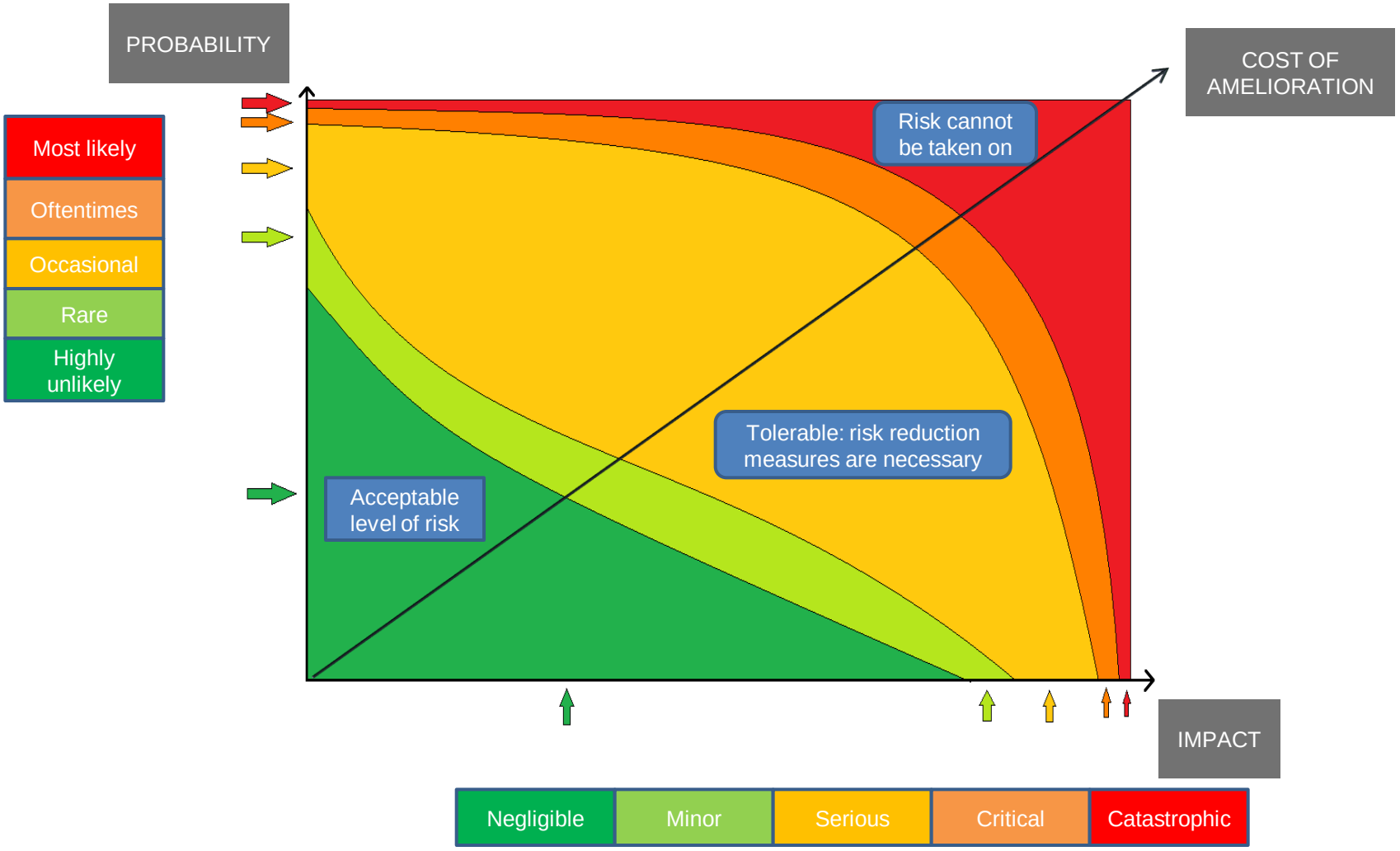
Eutrophication outlook to 2050

Indicator of Coastal Eutrophication Potential (ICEP), 2050



What matters is to set acceptable levels of risk..

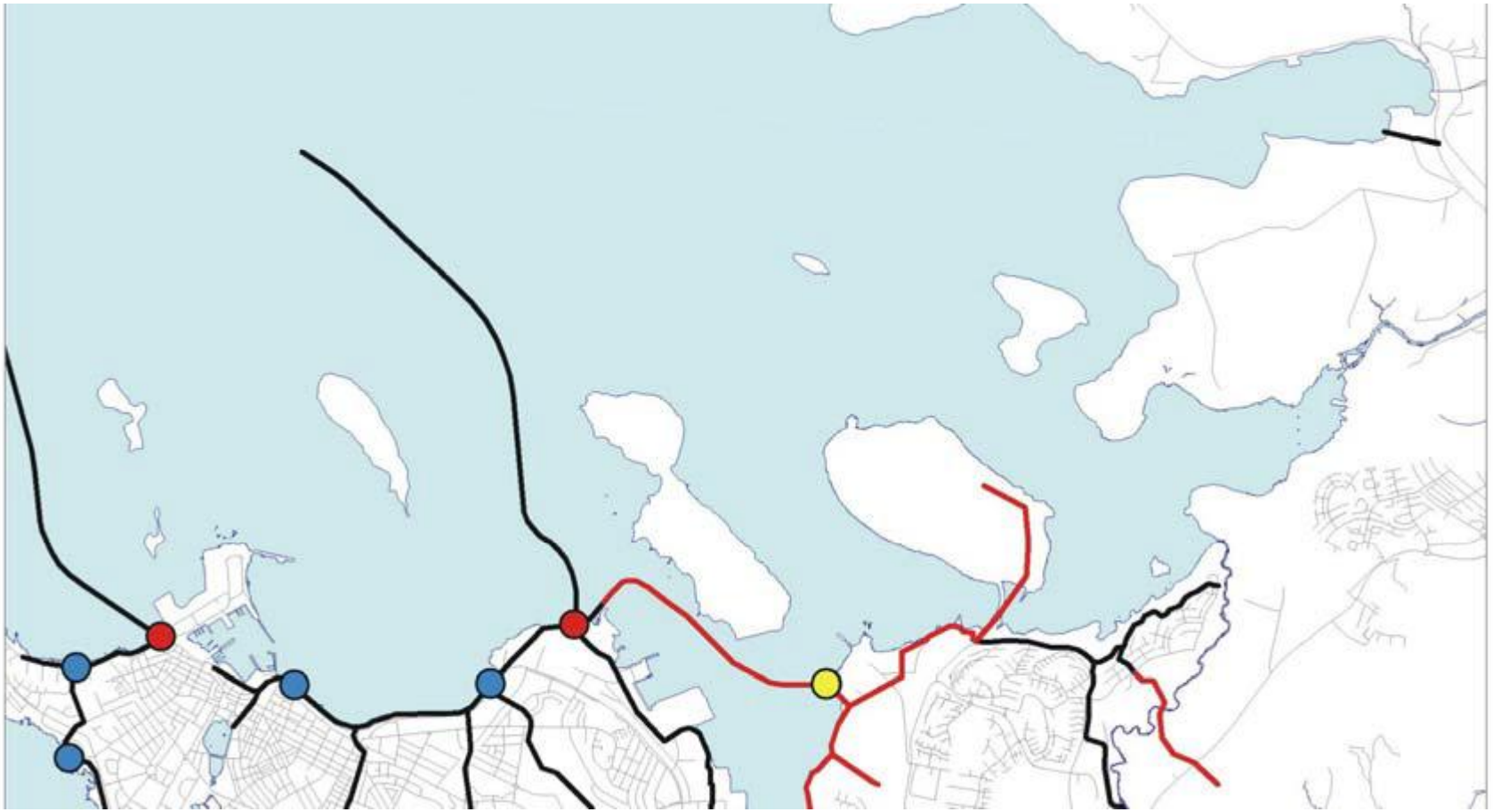
.. based on likelihood, consequences and cost of amelioration



A risk-based approach allows assessing policy priorities

- The aim is NOT to reduce (reactive) N emissions everywhere and at any cost
- The aim IS to improve water security
- Contrary to C, N risk is local even though all countries are affected
- The aim is to identify/delineate areas at risk of water insecurity (weak spots)
  - « know the risks »

e.g. no need to treat wastewater where there is dilution capacity (Reykjvavik sea outfall)

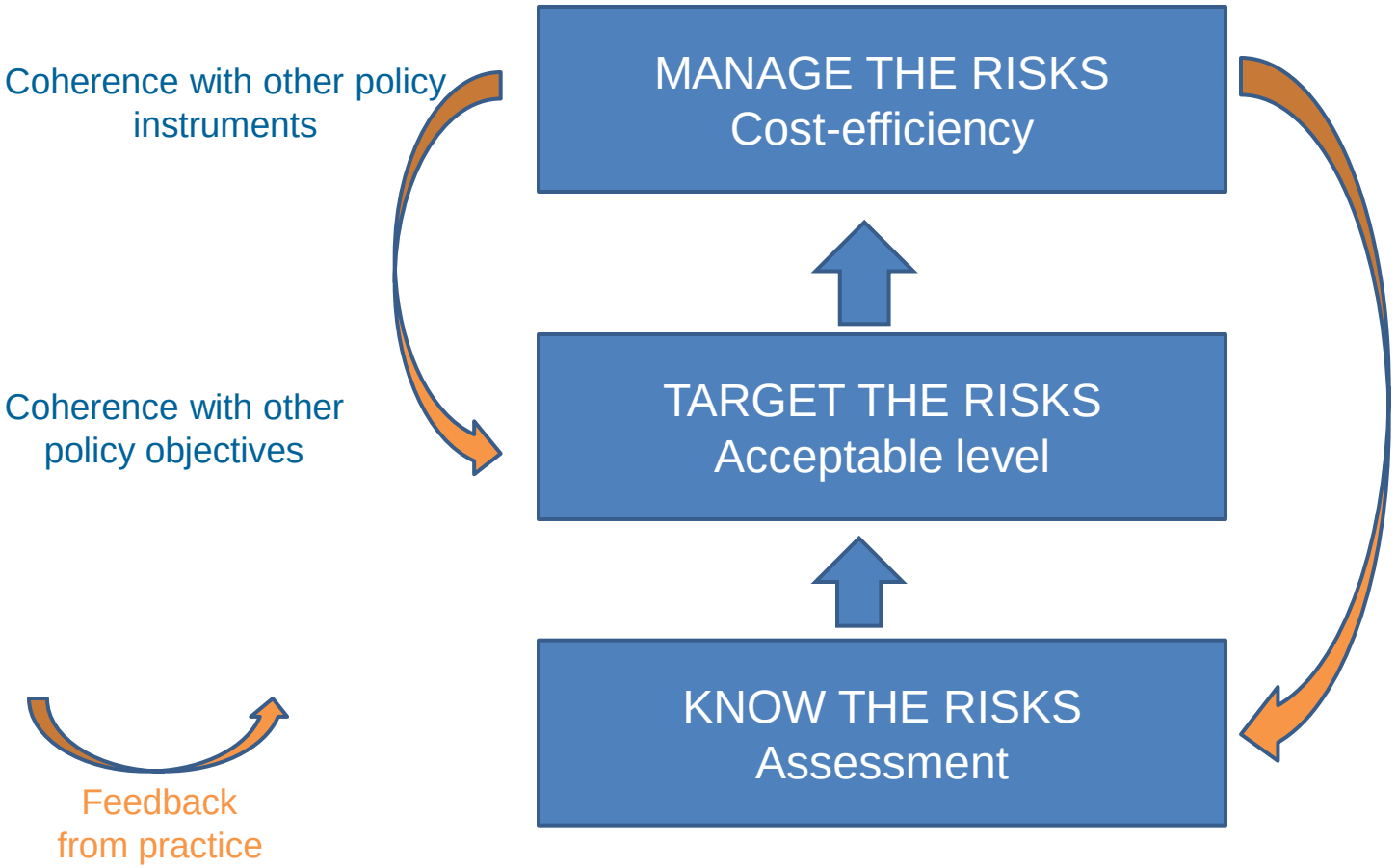


sewage treatment facility pumping station planned pumping station

main outfalls planned main outfalls

POLICIES

Water security: a three-step process



Improving water security (managing risks) requires sound economics

- Emissions permit trading schemes for point and nonpoint pollution.
  - allows pollution to be reduced from the lowest cost sources.
- Emissions taxes.
  - creates ongoing incentives to reduce pollution

OECD (2011), “Economic Instruments in Water Management",ENV/EPOC/WPBWE(2011)13

Case studies

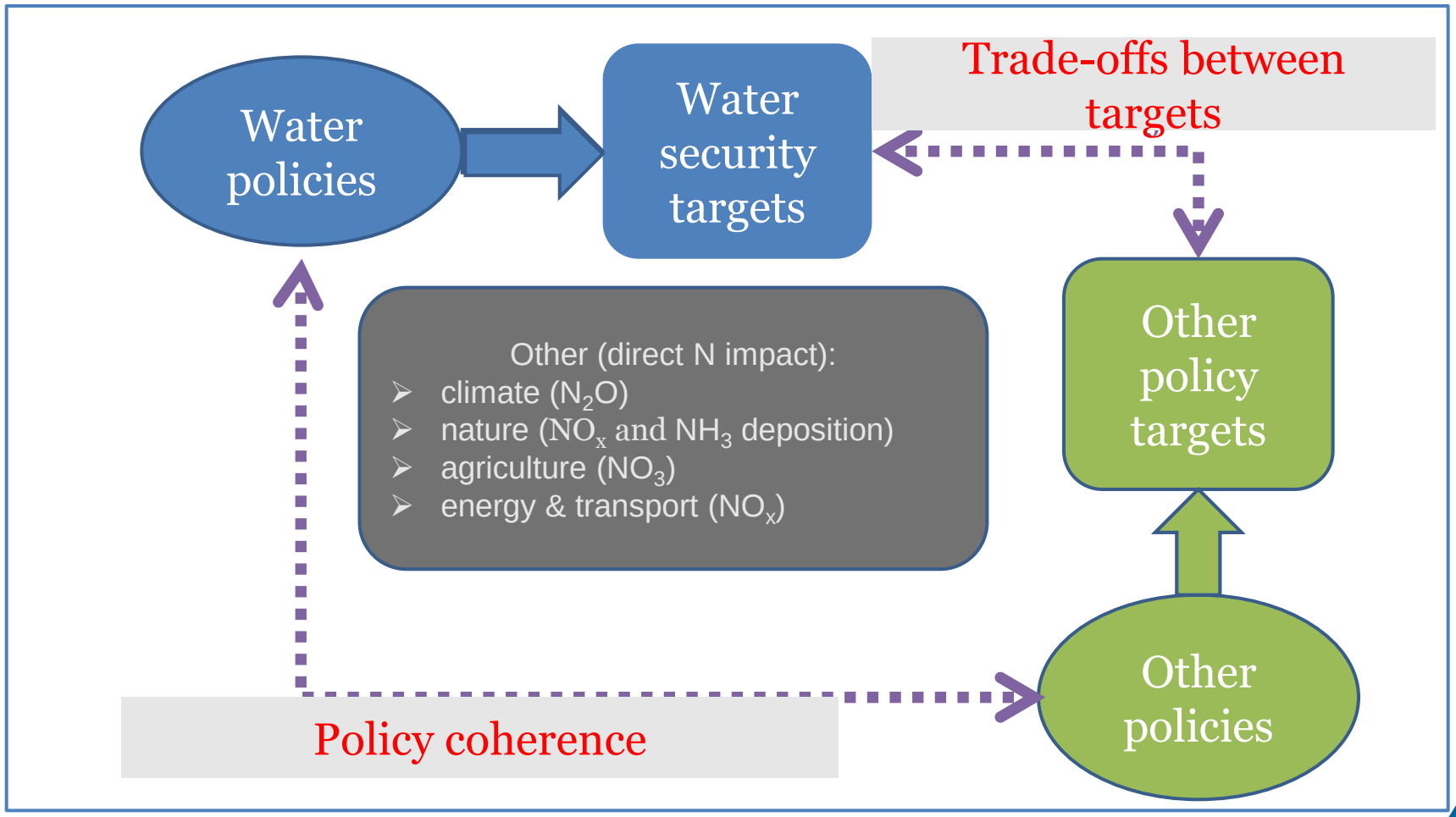
- Emissions trading schemes
  - ❖ generated USD 30 million in Long Island, U.S. and reduced pollution and water treatment costs in Hunter River, Australia
  - ❖ other trading schemes have been less successful due to high transaction costs
- Emissions taxes in western Europe have successfully reduced point source pollution
  - ❖ In the Netherlands emissions taxes led to a decrease in industrial organic emissions by 75%. Nonpoint source emission taxes have been less successful
  - ❖ In France, emissions taxes now make up around 1/3 of household water bills

OECD (2011), “Economic Instruments in Water Management",ENV/EPOC/WPBWE(2011)13

Improving water security (managing risks) also requires policy coherence

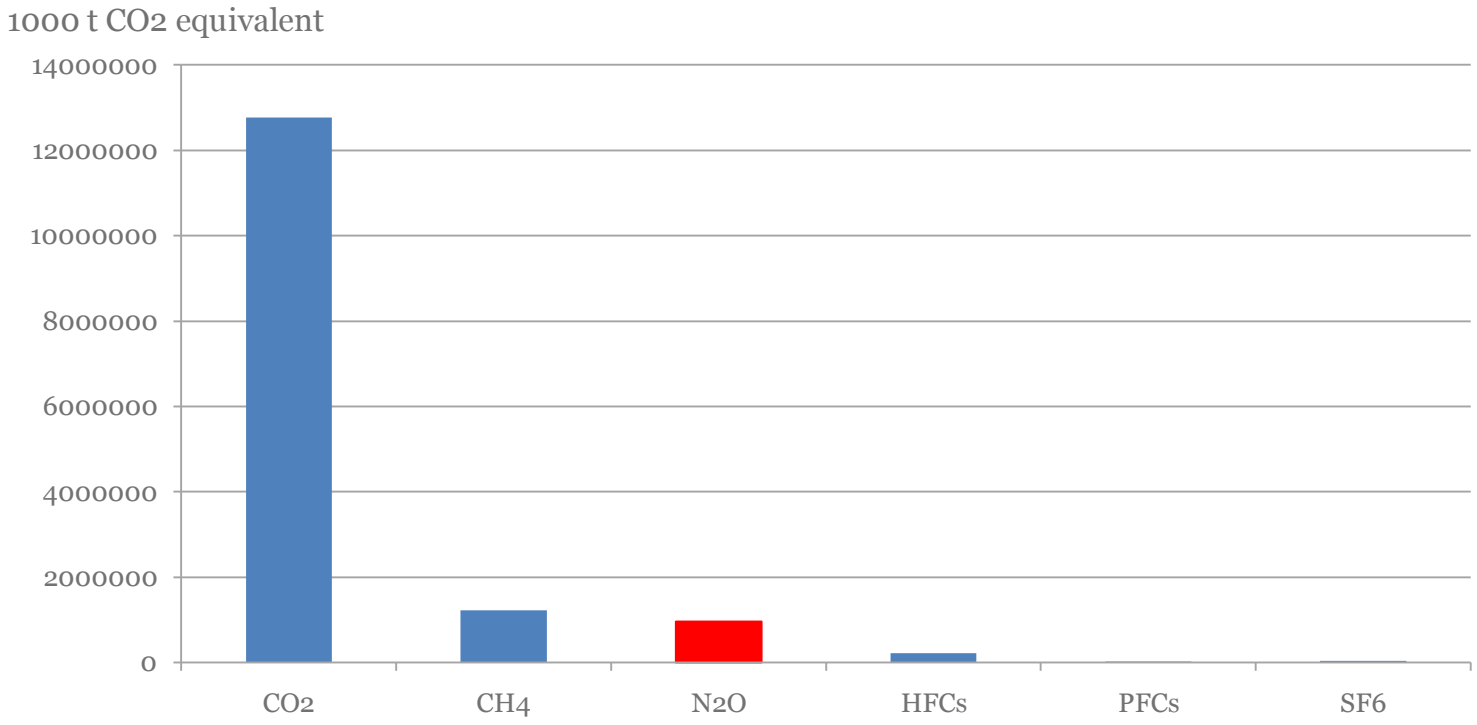
1. when setting water security targets
2. when designing policies to meet the water security targets

Coherence: targets and policies



Policies to mitigate climate change affect N

Directly, e.g. through curbing N2O emissions from fertiliser use



N_2O is a GHG (6% of OECD GHG emissions)

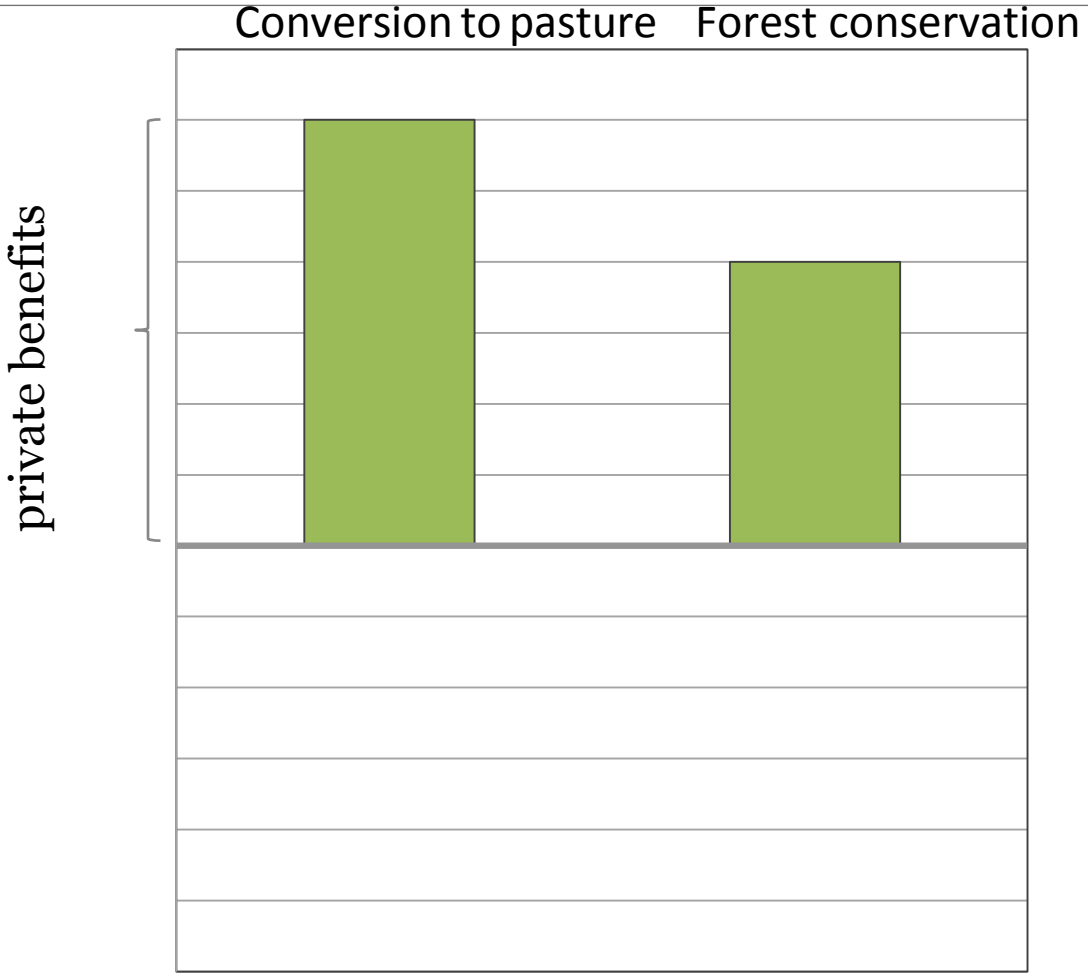
Policies to mitigate climate change affect N

Indirectly, e.g. through fostering land use change for carbon sequestration

e.g. in New Zealand, in places where it has induced farmland conversion into forests, carbon emission trading has reduced nitrogen releases into water.

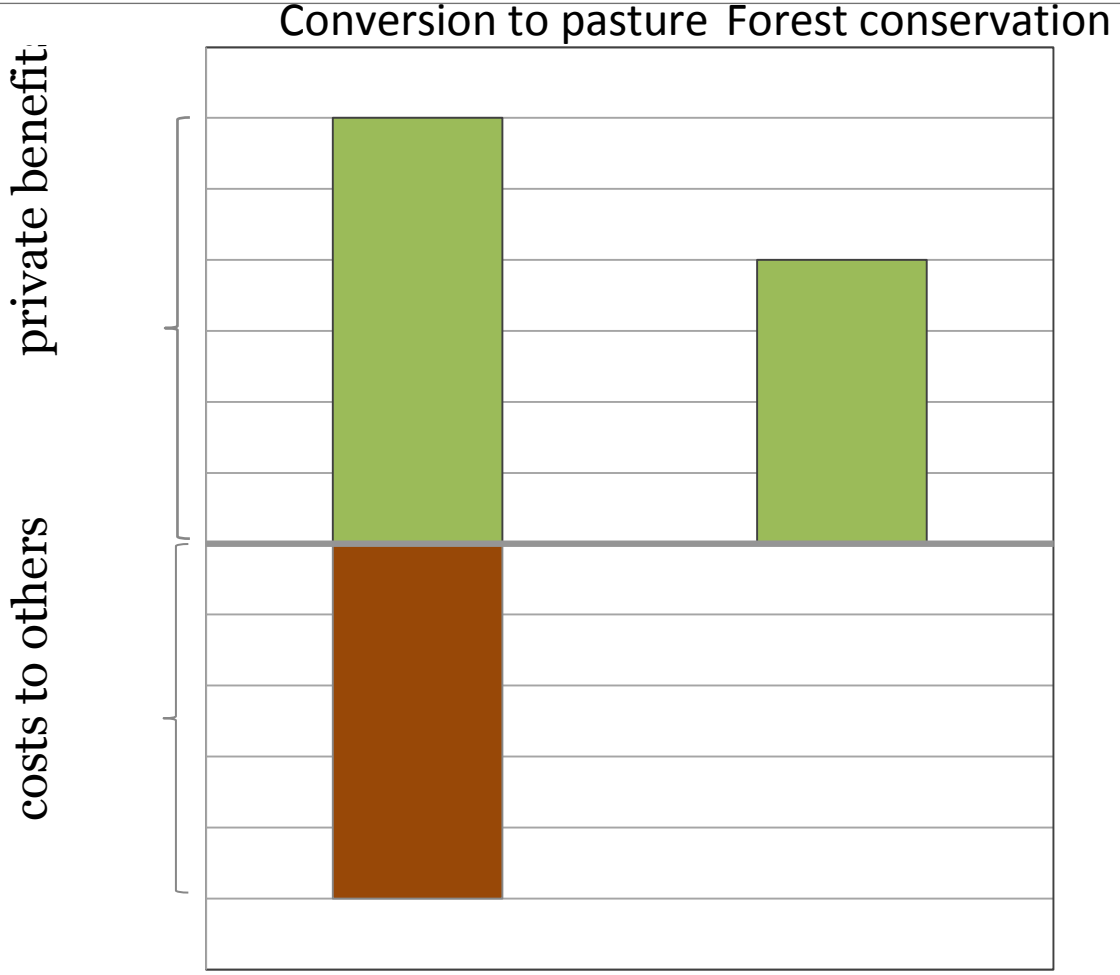
Lake Taupo, New Zealand

Lake Taupo, New Zealand



S. Kerr (2012), Presentation at the OECD Expert Workshop on Water Security.

Costs exceed private benefits



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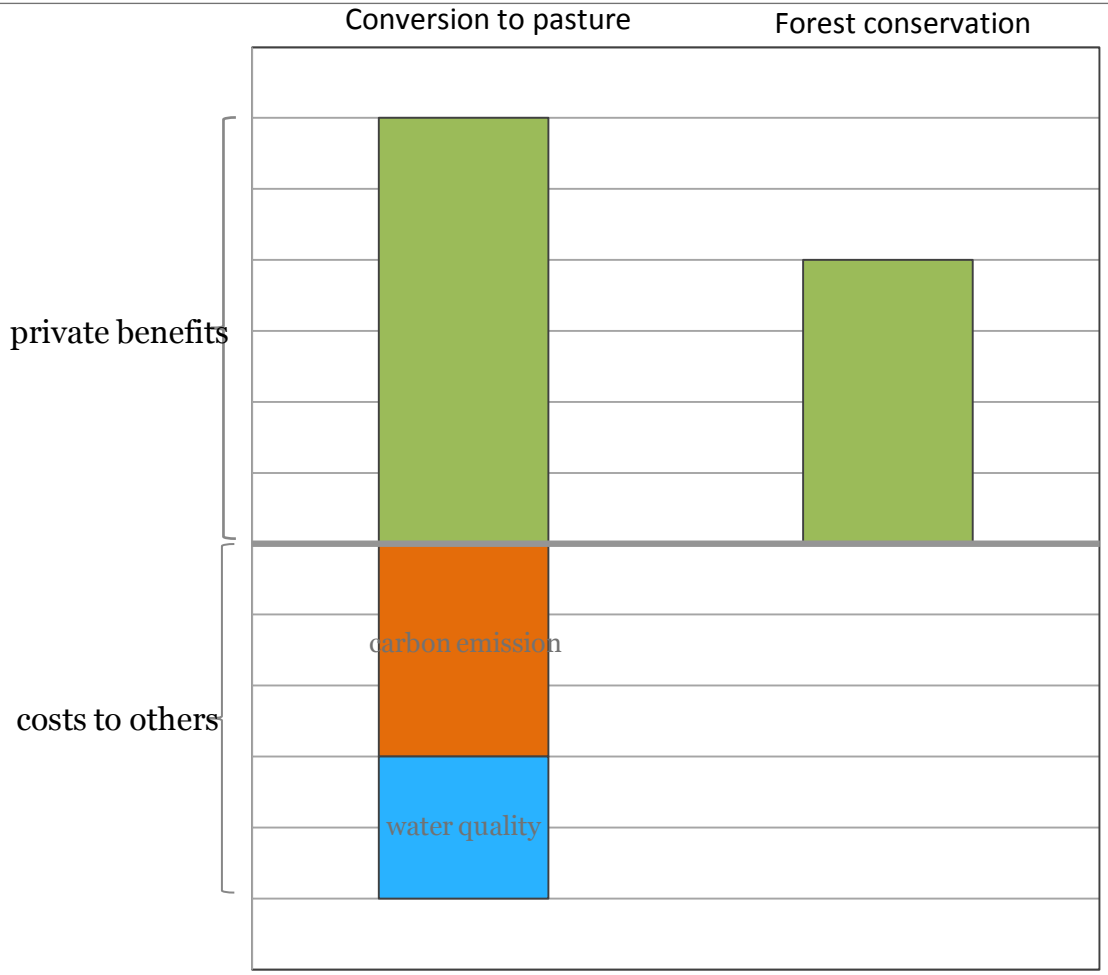
Policy Interactions



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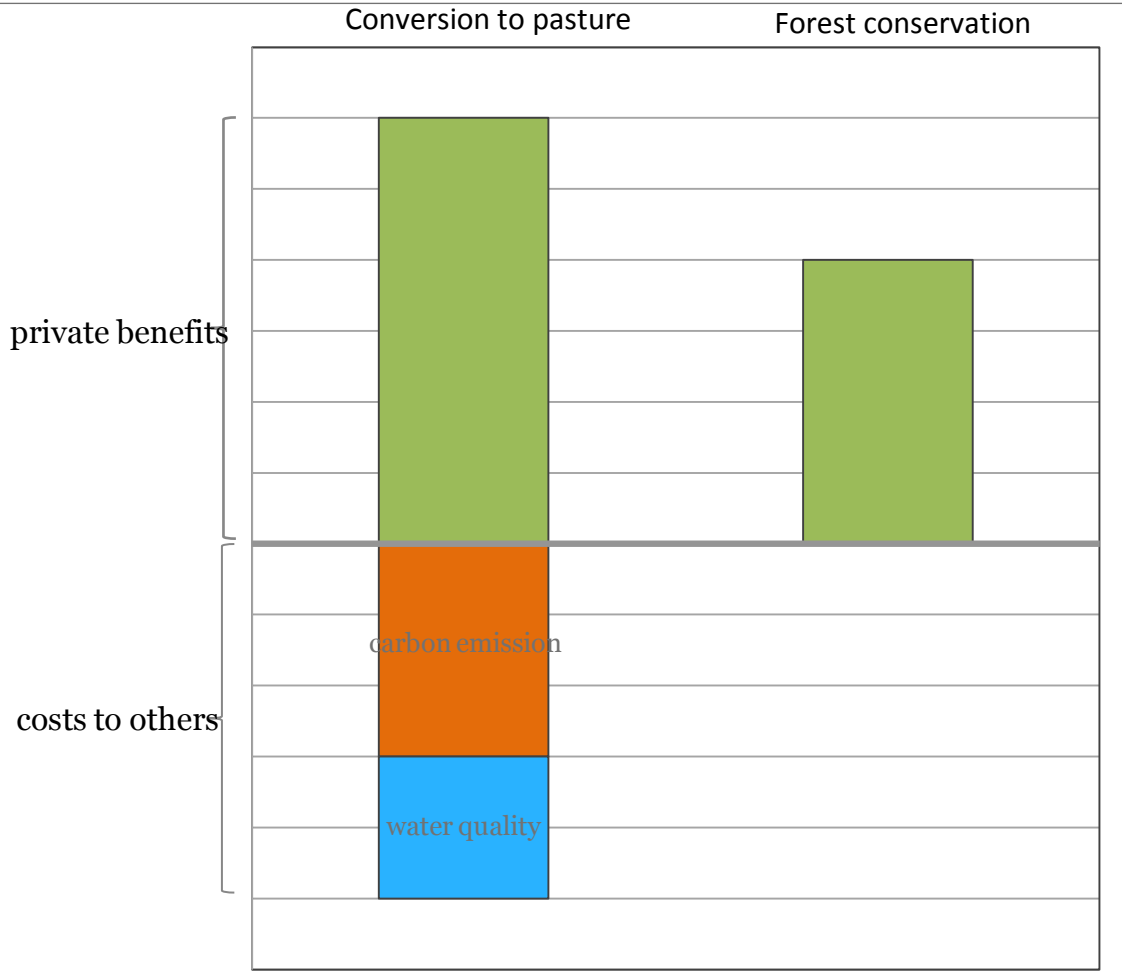
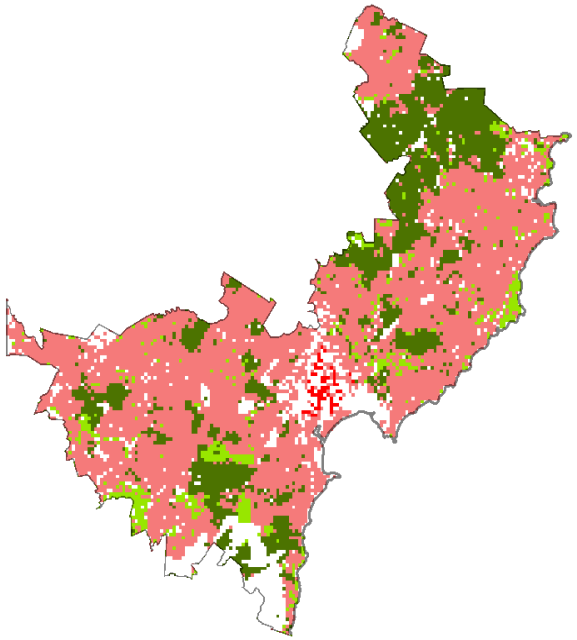


Land use



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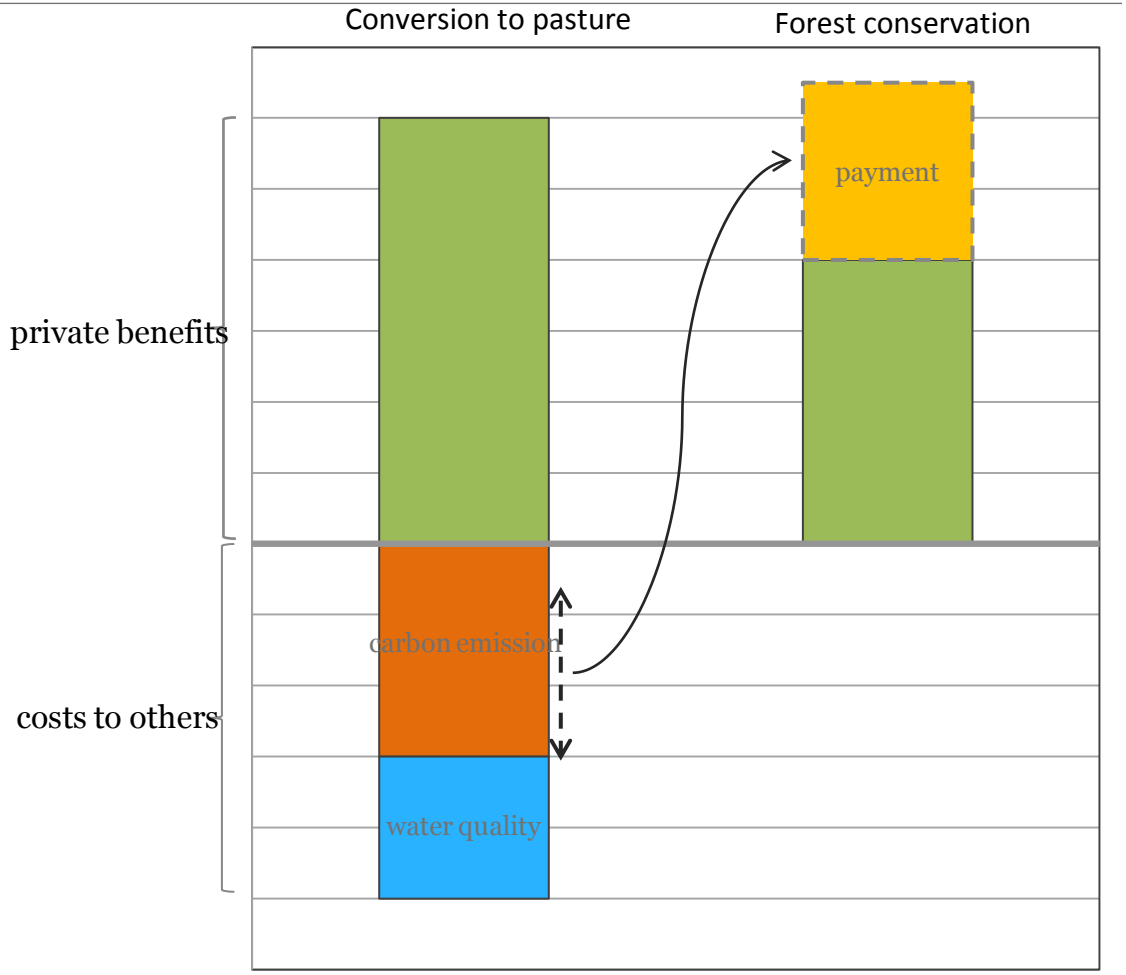

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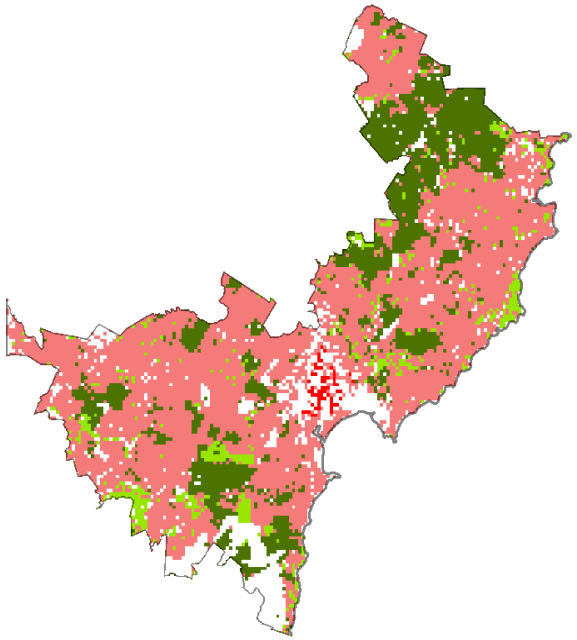

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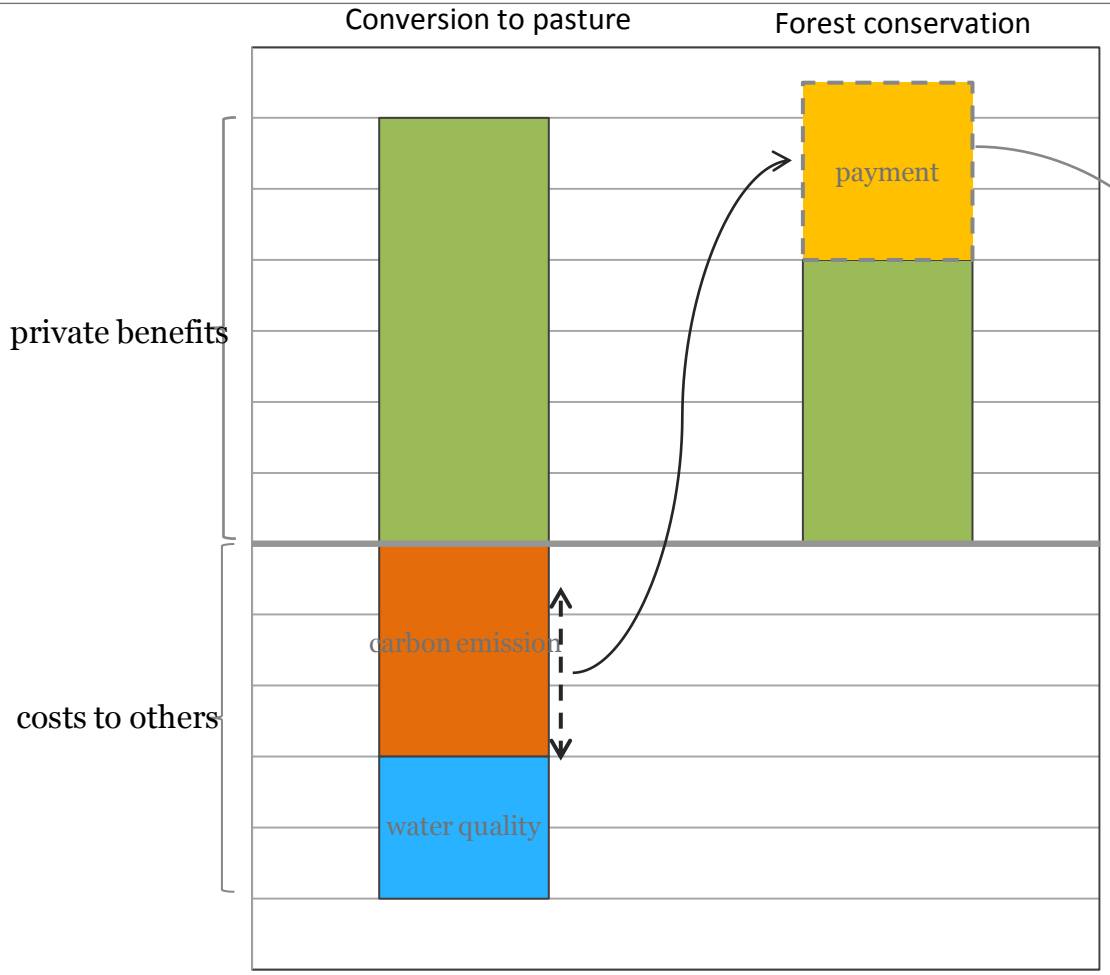

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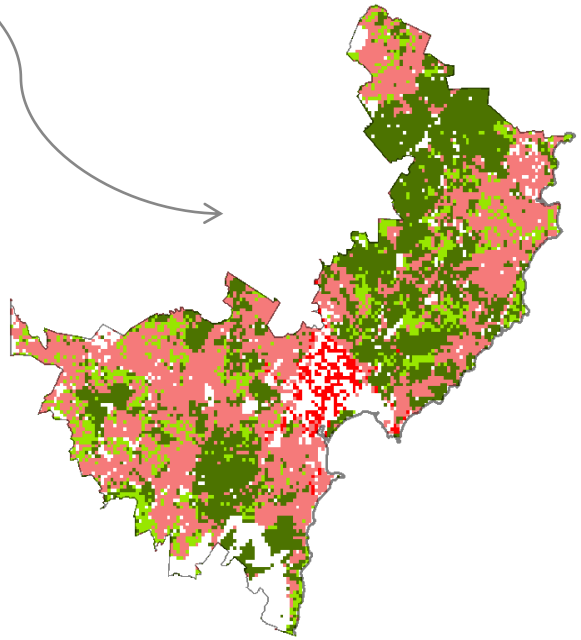

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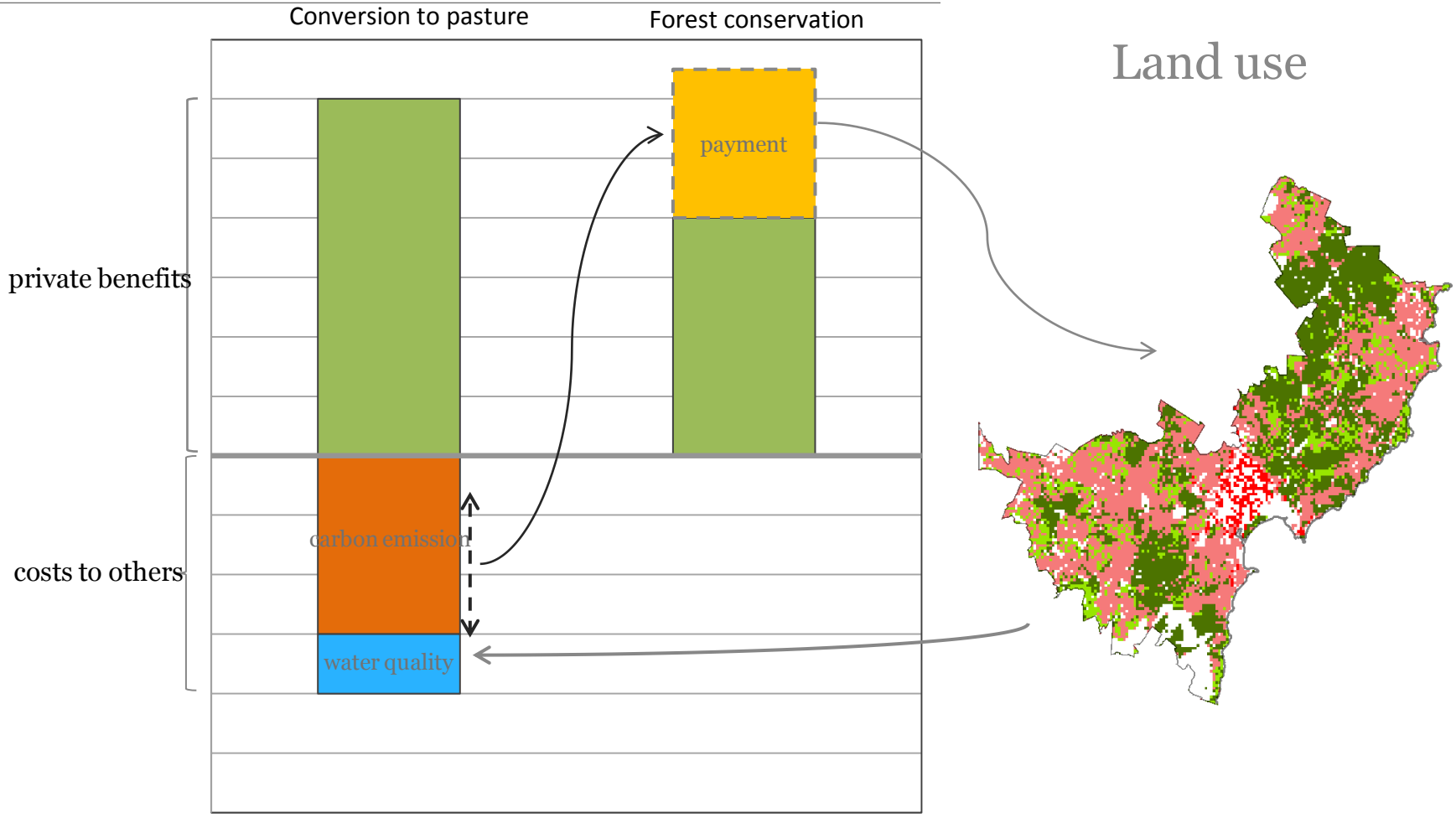

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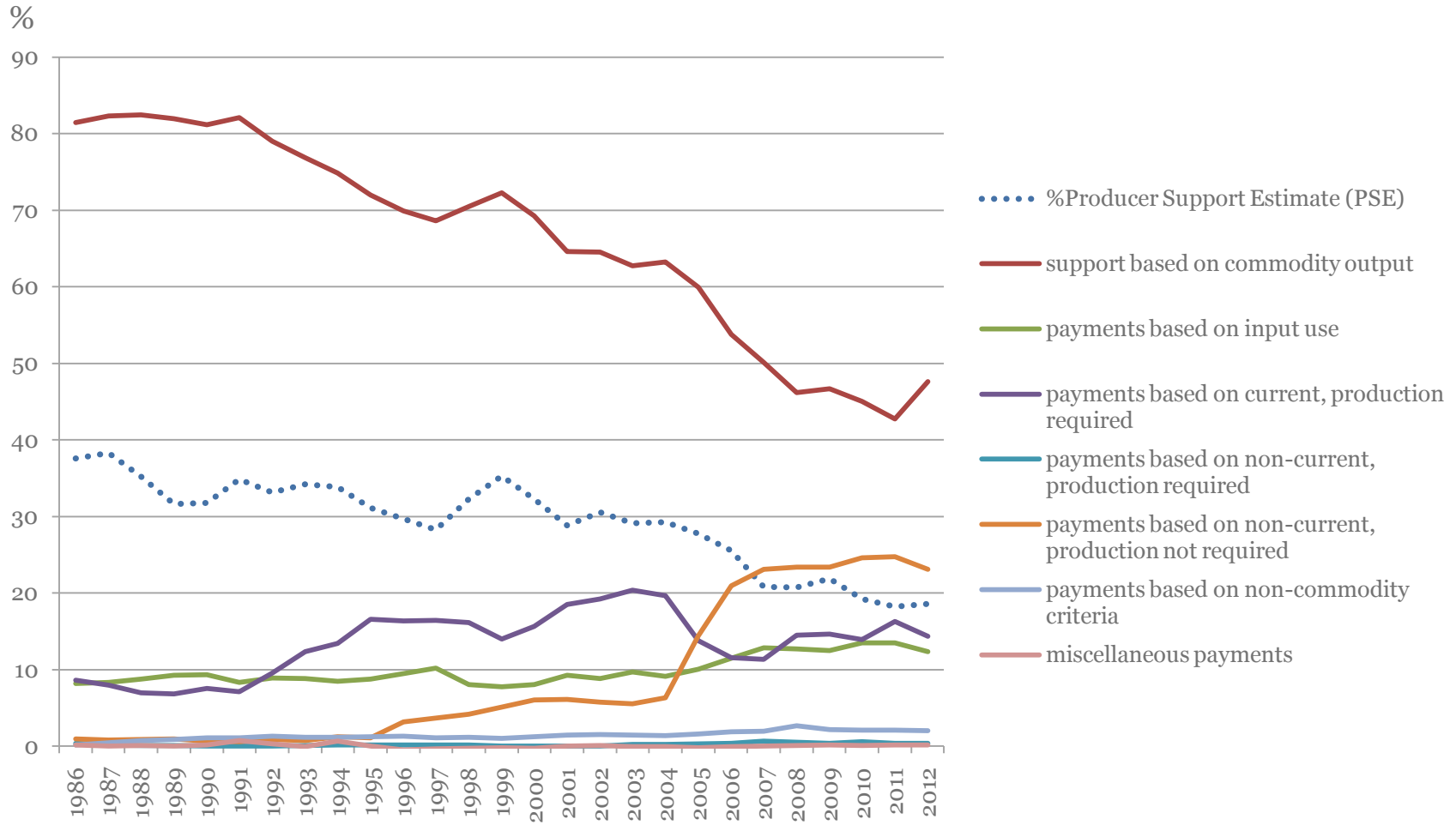
Policy coherence for managing water risks

- Similar examples of policy coherence can be drawn from:
  1. nature conservation policy,
  2. agricultural policy,
  3. energy and transport policy..

1. Payments for ecosystem services (PES)

- flexible, incentive-based and site-specific >> can improve cost effectiveness in managing water risks, compared to indirect payments or other regulatory approaches.
- should only compensate holders of land-use rights (e.g. farmers or foresters) for the additional costs of ecosystem service provision, over and above legal requirements.
- should not take the form of uniform payments per hectare, as is often the case, but take account of differences in ecosystem benefits and opportunity costs for holders of land-use rights.

2. Agricultural policy reform, OECD area



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In a nutshell

- The frame of action to address N and P should be guided by water security objectives, NOT by across-the-board N reduction
- This entails establishing « acceptable levels of water risks » (scientific, economic and concern assessments), coherent (trade-off) with other policy objectives, such as food security, energy security, climate change mitigation, nature conservation
- .. and learning to live with them :
  - through direct actions
    - Emissions permit trading schemes for point and nonpoint pollution.
    - Emissions taxes.
  - coherent with measures to achieve other policy objectives:
    - carbon cap-and-trade (climate mitigation)
    - Payments for Ecosytem Services (nature conservation)
    - Environmentally Harmful Subsidies (context of agricultural support),
    - Taxation of externalities (NOx tax on energy and transport)

www.oecd.org/water

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