

# **Ecosystem damage valuation**

Experiences in the Netherlands

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# Revealed preference for ecosystem protection

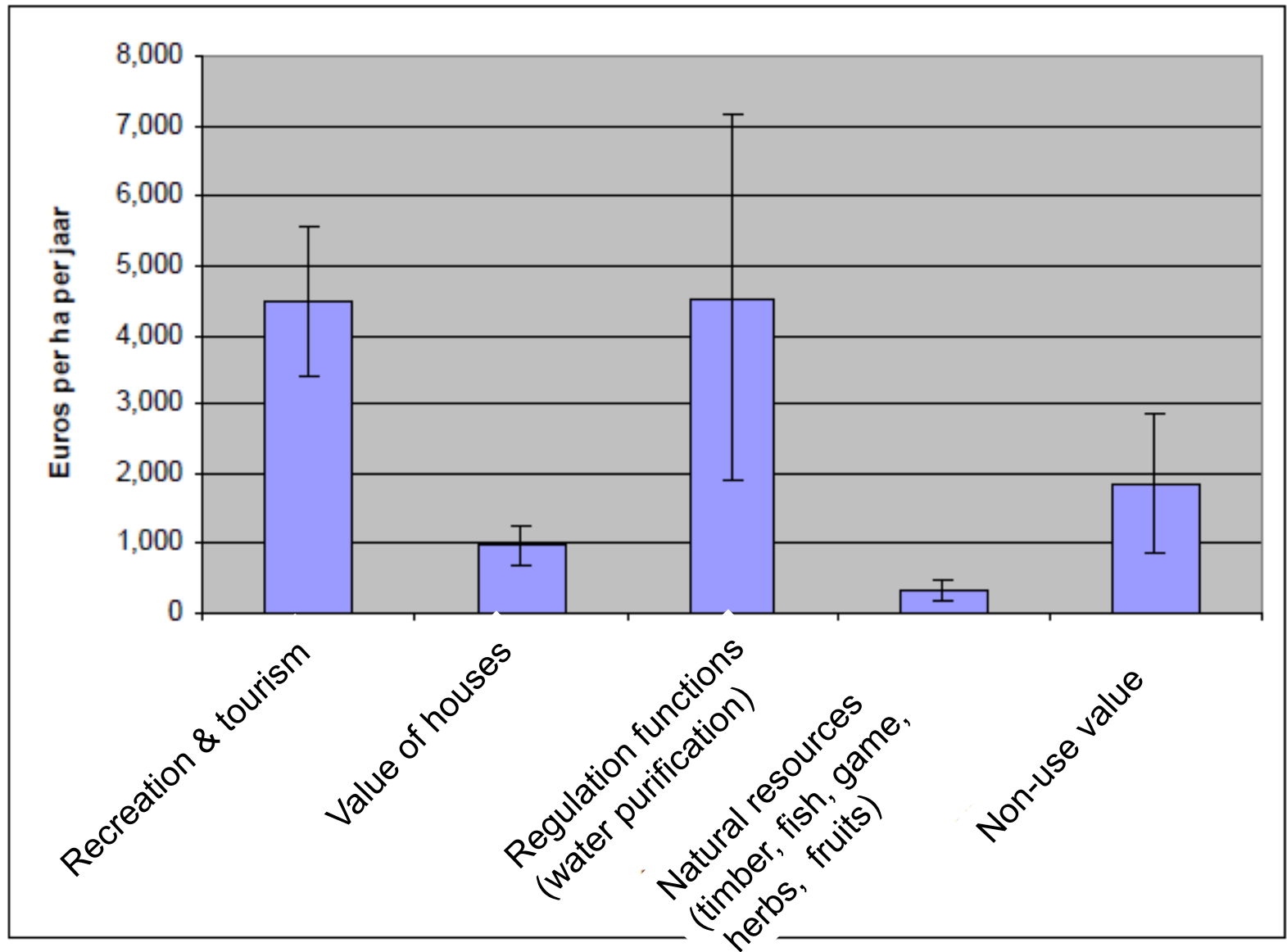
## Public choices (government decisions):

- Value Waddensea → no gas recovery (> €1 bn)
- A28 Motorway - Amelisweerd → rerouting, partly tunneled (20 ha > €100 mn)
- Thalys - Green heart → tunnel (6 km - €1 bn)
- Extension Rotterdam harbour → 750 ha new nature (> €100 mn)
- Annual budget for ecosystem restoration → mowing, grazing, replanting (€85 mn/yr)

## Individual choices:

- 55% of the households support nature conservation organisations (€40-300 per household per year)

# Value of nature in the Netherlands (€/ha/yr)



(Kuik, VU Amsterdam, 2006)

# Nitrogen damage to ecosystems: focus on restoration costs



*Dunes of Soest 20 ha - €100.000/yr (or €5000/ha/yr)*



# N addition experiment in the Netherlands (published in 1991)

## Species-rich chalk grassland



# What is driving restoration costs in the Netherlands? Heathland without grass!



# Restoration: remove dominant plant species (plants we don't like)



Grass – Purple moor



Nettle



Common ragweed

# Trade off - step 1: Impacts of Nitrogen on Biodiversity

Species loss (in %) with an exceedance of N-critical loads by  
500/1000/1500 mol N/ha/yr  
compared to the situation with no exceedance

|             | Forests on<br>sandy soil | Forests on<br>rich soils | Dry<br>heathland | Wet<br>heathland | Moorland   | Natural<br>grassland |
|-------------|--------------------------|--------------------------|------------------|------------------|------------|----------------------|
| Butterflies | -                        | -                        | -16/-29/-41      | -                | -          | -35/-58/-73          |
| Birds       | -8/-17/-25               | -5/-10/-15               | -5/-10/-14       | -11/-22/-33      | -9/-20/-32 | -8/-15/-23           |
| Plants      | -17/-30/-42              | -24/-43/-58              | -14/-27/-38      | -                | -          | -                    |
| Total       | -9/-18/-25               | -8/-15/-22               | -10/-19/-27      | -                | -          | -10/-19/-28          |

(Van Hinsberg et al., 2008)



# Trade off – step 2

## Multi criteria assessment of different ambition levels in the Netherlands

|   | 2005  | 2020 BL | 2020 Low* | 2020 MID | 2020 High* |
|---|-------|---------|-----------|----------|------------|
| Exceedance Critical Loads Natura 2000 (mol/ha/yr) | 840   | 430     | 337       | 326      | 312        |
| Biodiversity loss %                               | 13-16 | 6-7     | 5-6       | ~ 5      | 4-5        |
| € Restoration costs (mn/yr)                       | 85    | 45      | ~35       | ~35      | ~35        |

# European Nitrogen Assessment

Ecosystem damage based on  
restoration cost estimate of € 5000/ha/yr (NEEDS – 2006)

| Effect                              | Damage<br>€/kg N | Total damage<br>EU27<br>bn €/yr | Total damage<br>NL<br>bn €/yr |
|-------------------------------------|------------------|---------------------------------|-------------------------------|
| Loss of<br>biodiversity<br>on land  | 2-10             | 10-70                           | 0.8-3.9                       |
| Loss of<br>biodiversity in<br>water | 5-20             | 15-50                           | 0.4-1.7                       |

*ENA, van Grinsven et al, 2011*

**30-50% N-reduction could lead to a ecosystem benefit of 10-50 bn/yr**