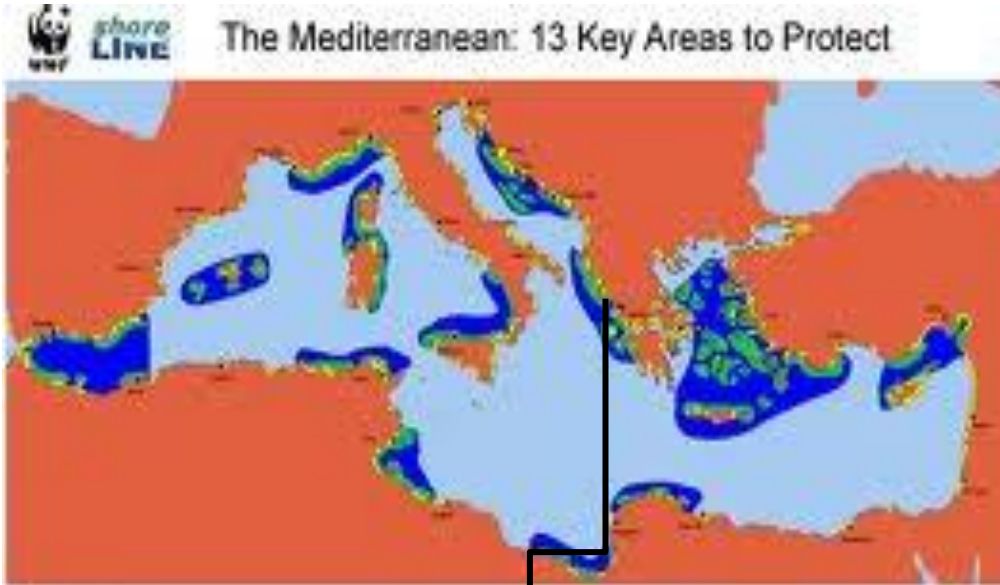


Measures to Improve Environmental Conditions in the Louros Catchment, Greece

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The Louros River and the Amvrakikos Gulf



- The river creates an important catchment and ends up to one of the most significant Ramsar Convention sites in Greece
- Announced a Nitrate Vulnerable Zone in 1996
- No action taken until now
- Agriculture is held responsible for nitrification and phosphates pollution

The Louros River: Water and Habitats

Issues:

- Water quantity and quality for municipal use, energy, agriculture, industry, aquaculture and tourism
- Electricity production
- Important estuaries for habitats and biodiversity
- Poor monitoring of water biological, chemical and physical properties
- Strong public pressure for action to prevent nitrification and phosphate pollution



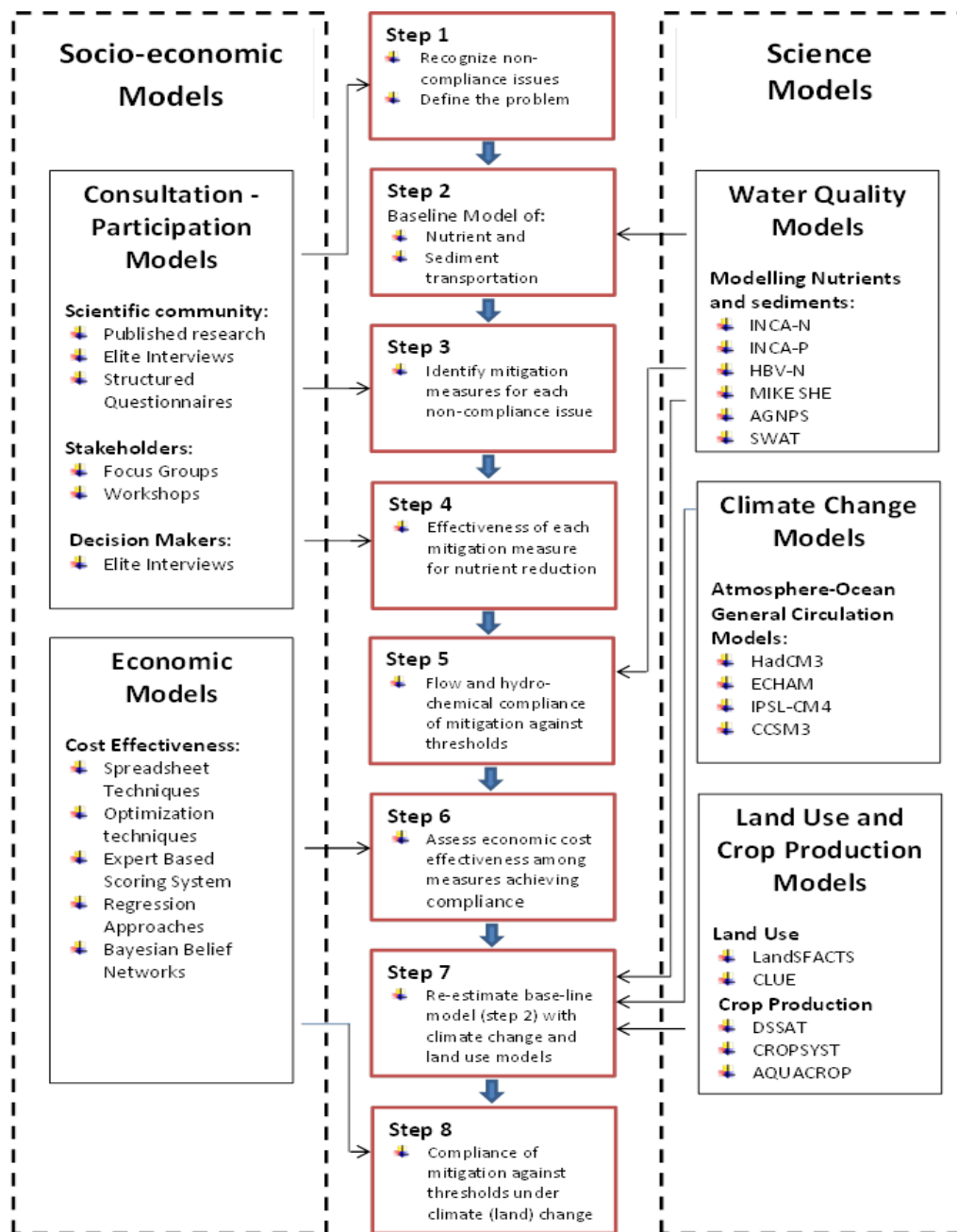
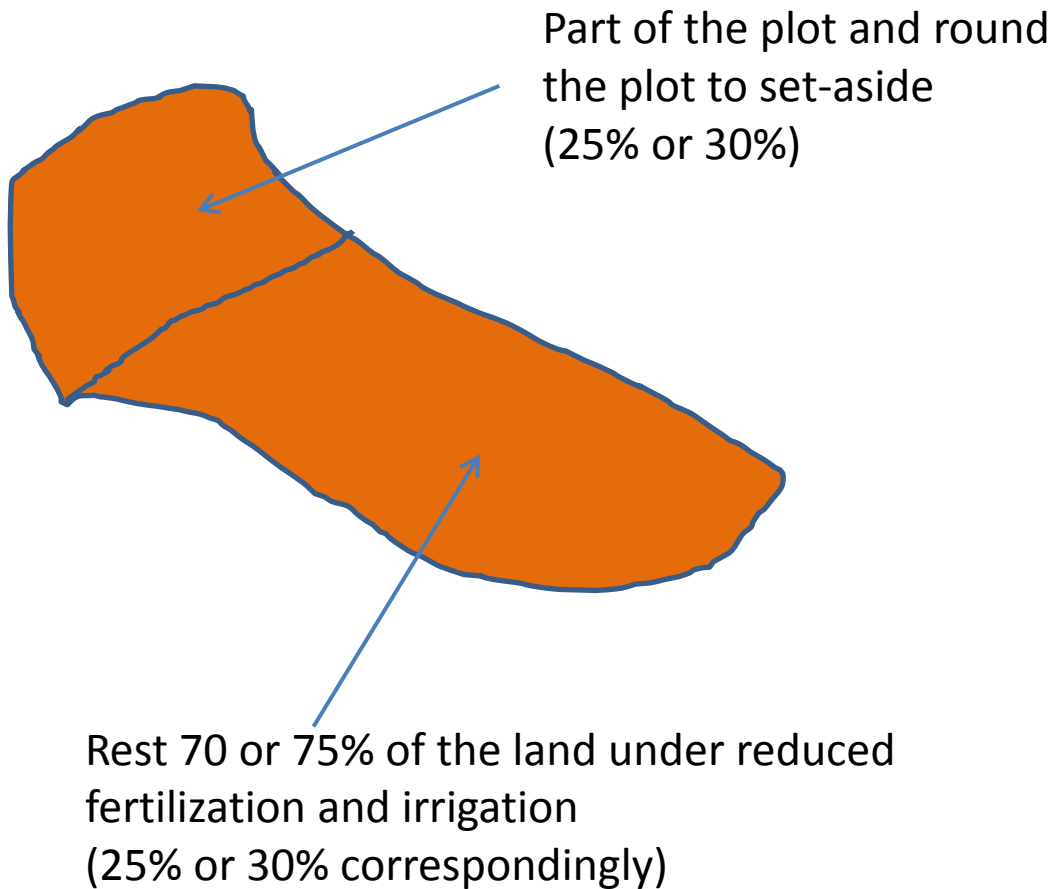


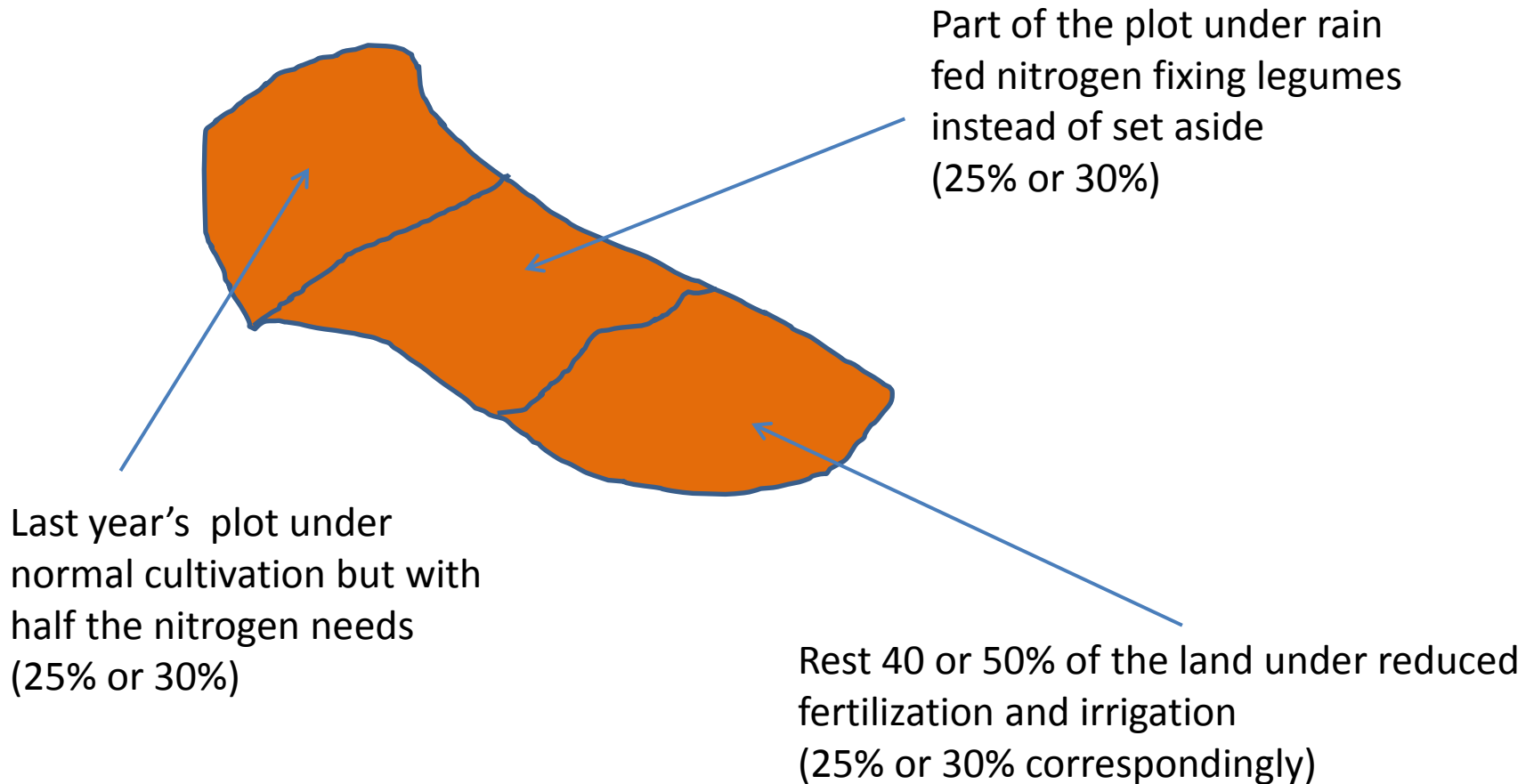
Figure 1. The eight step decision process integrating socio-economic and science models.

The idea behind mitigation measures: Two “Technologies”

A. Set aside



B. Allow set aside to be rain fed cultivated with nitrogen fixing legumes



Baseline nutrient application

- 2 thousand tonnes of nitrogen
- 1.3 thousand tonnes of phosphorous on
- 11,000 hectares of intensively cultivated land

Plus:

- Nutrients from grazing animals, hog farming, aquaculture and municipal waste waters

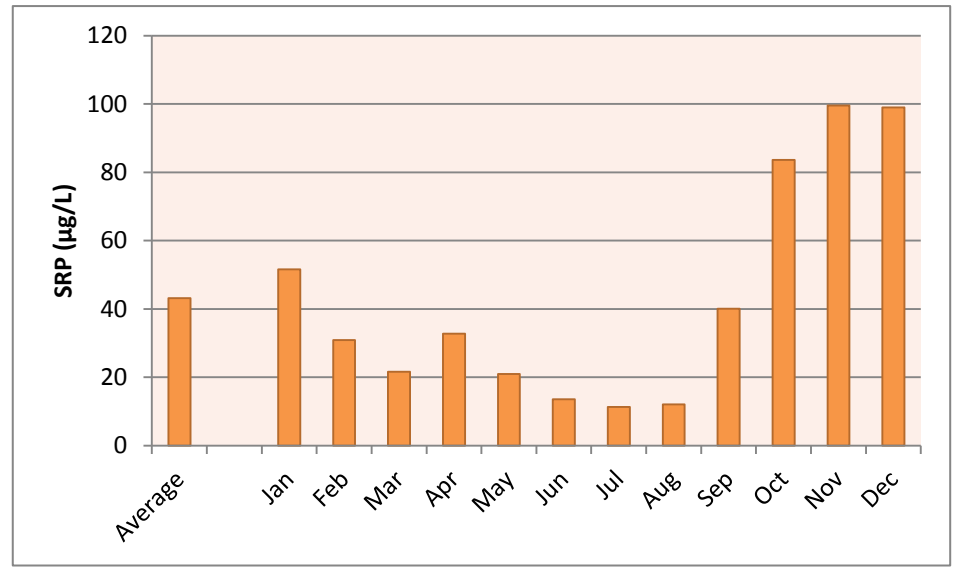
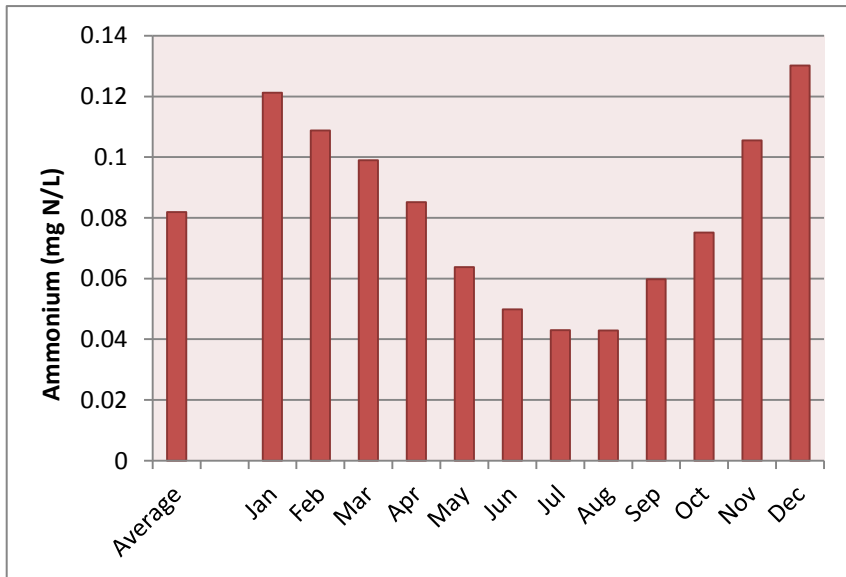
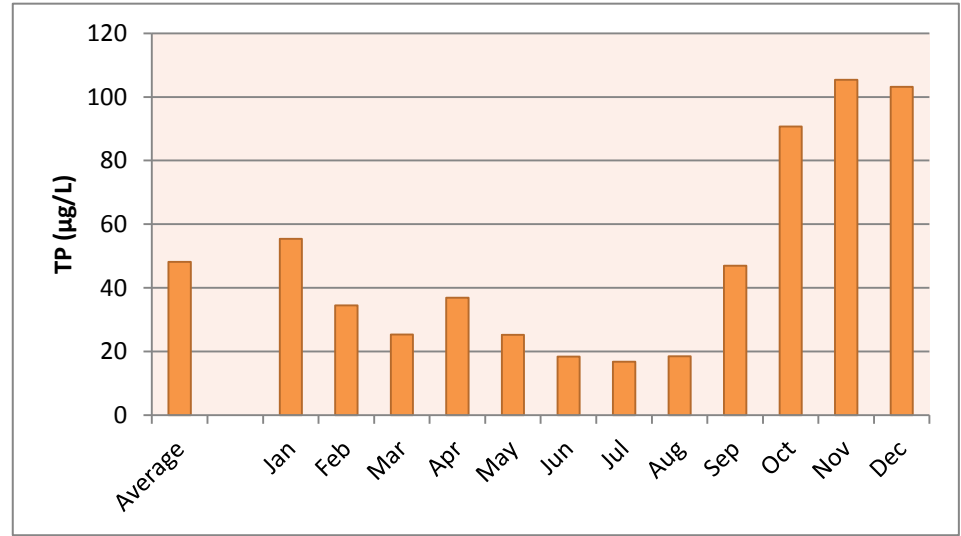
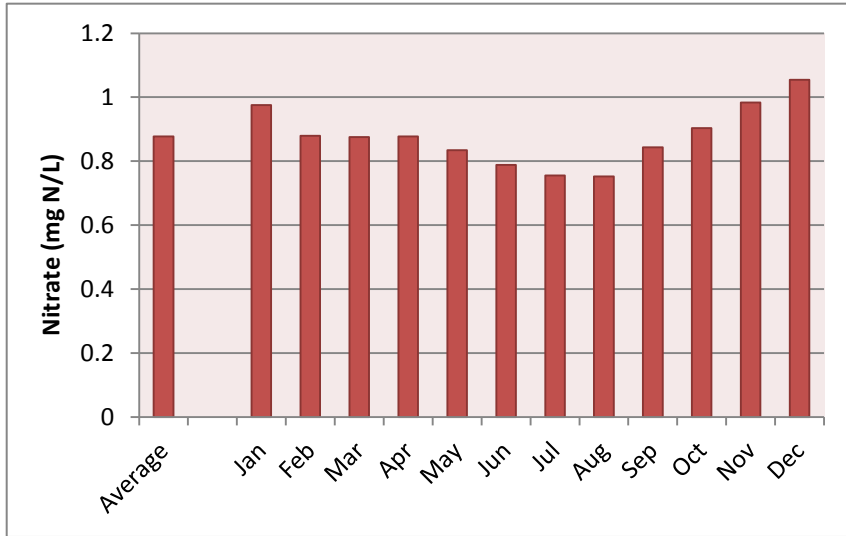
Estimate the cost of measures

- Four major cultivations (cotton, maize, medic, citrus fruit)
- Income forgone
- Additional costs
- Transaction costs
- Estimates based on “average” farm and RICA-FADN data



Surprise

the waters are clean!!!!

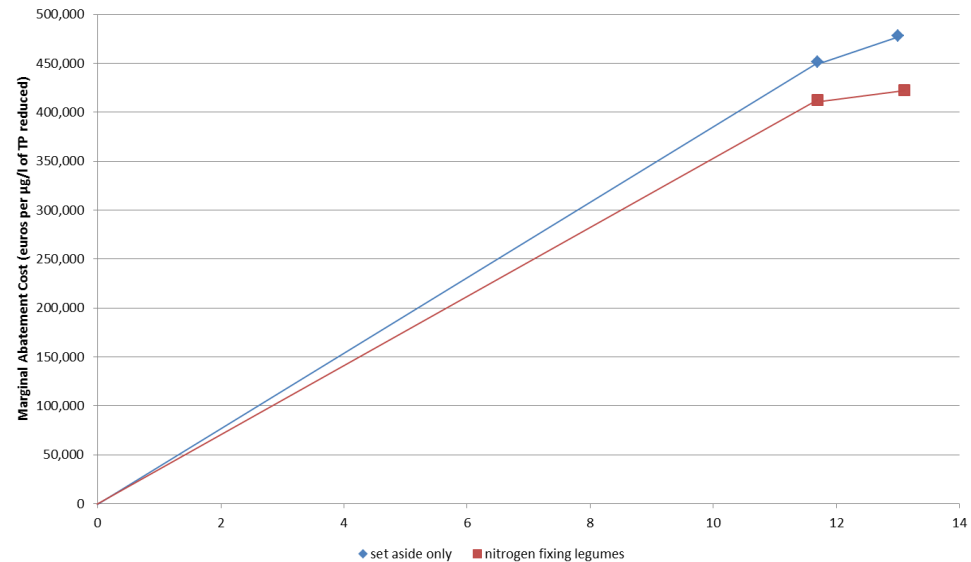
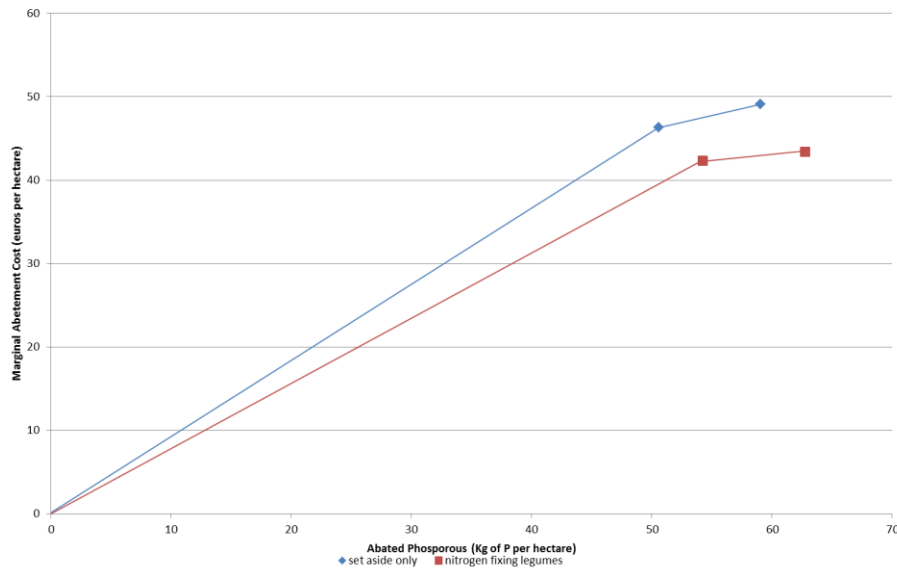


What is abatement?

Policy targets expressed in Kg of N or P

Environmental standards expressed in mg/l or $\mu\text{g/l}$

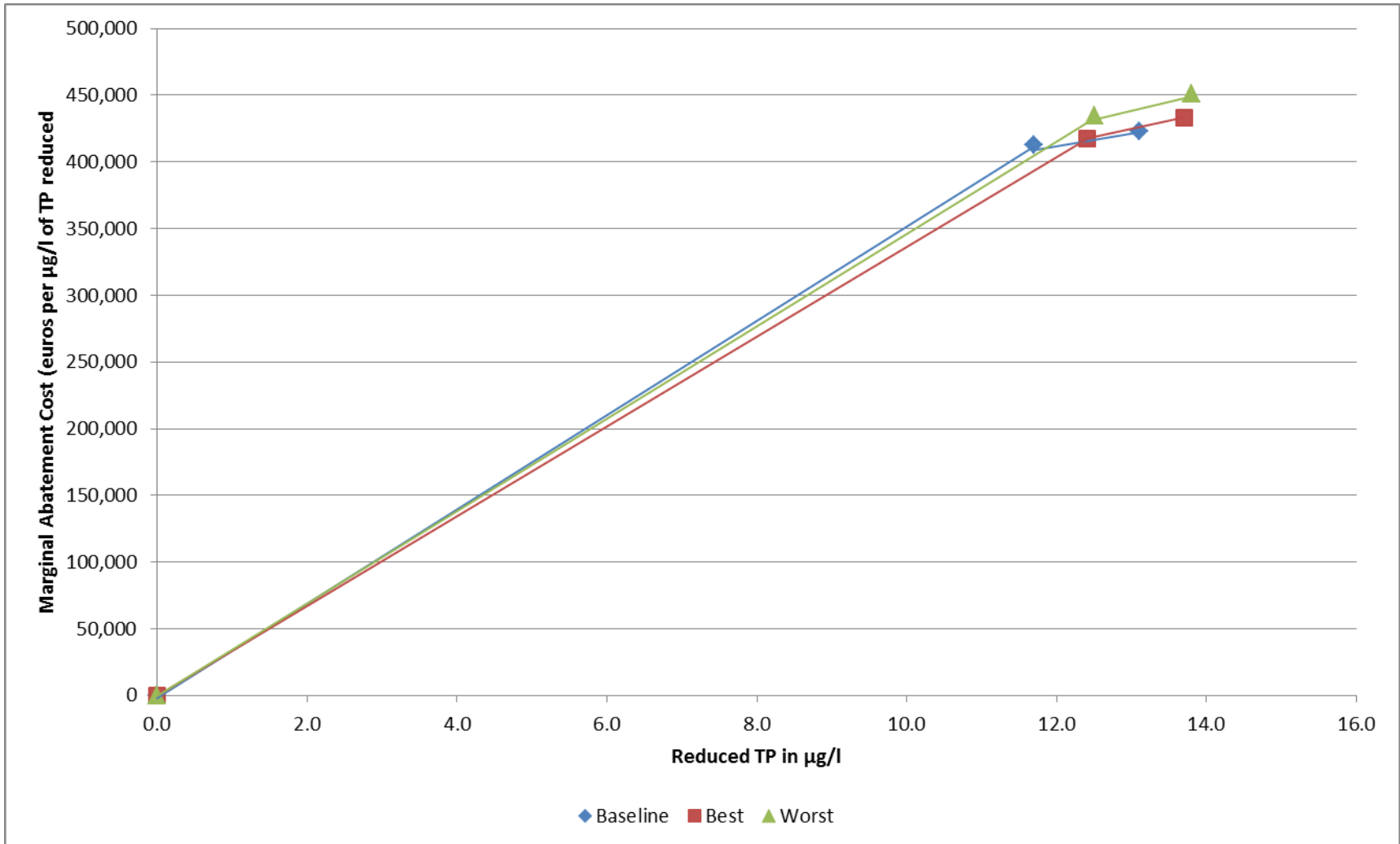
Is there a straightforward relationship?



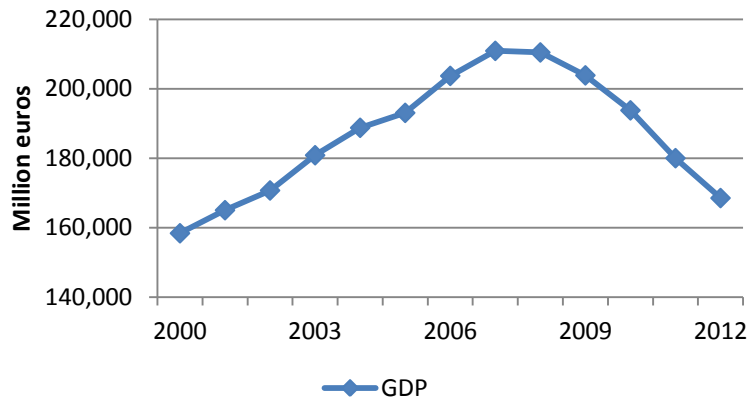
Climate and Land Use Change

For the “technology” allowing nitrogen fixing legumes on the set aside land, MACCs are shifted to the right under either the worst or the best climate change scenarios.

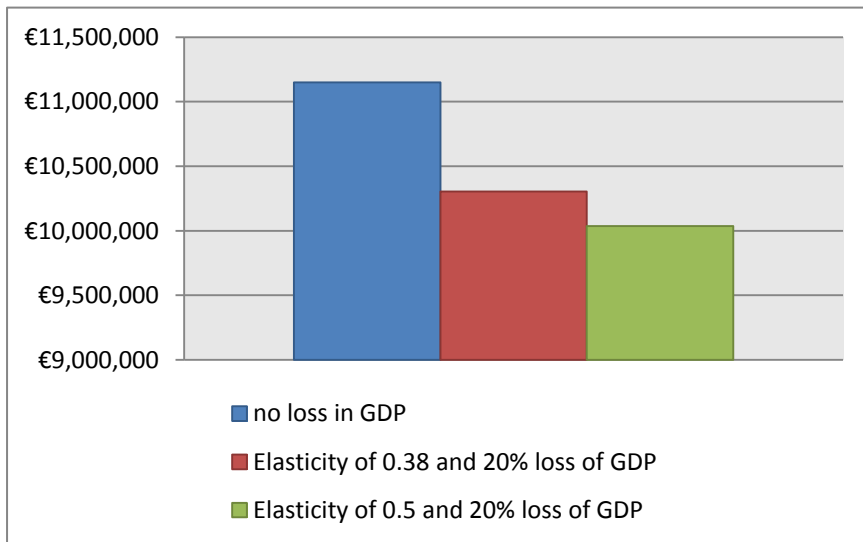
This means that, if we have had adopted the cost effective baseline scenario this will remain so under climate change.



Estimating the benefits

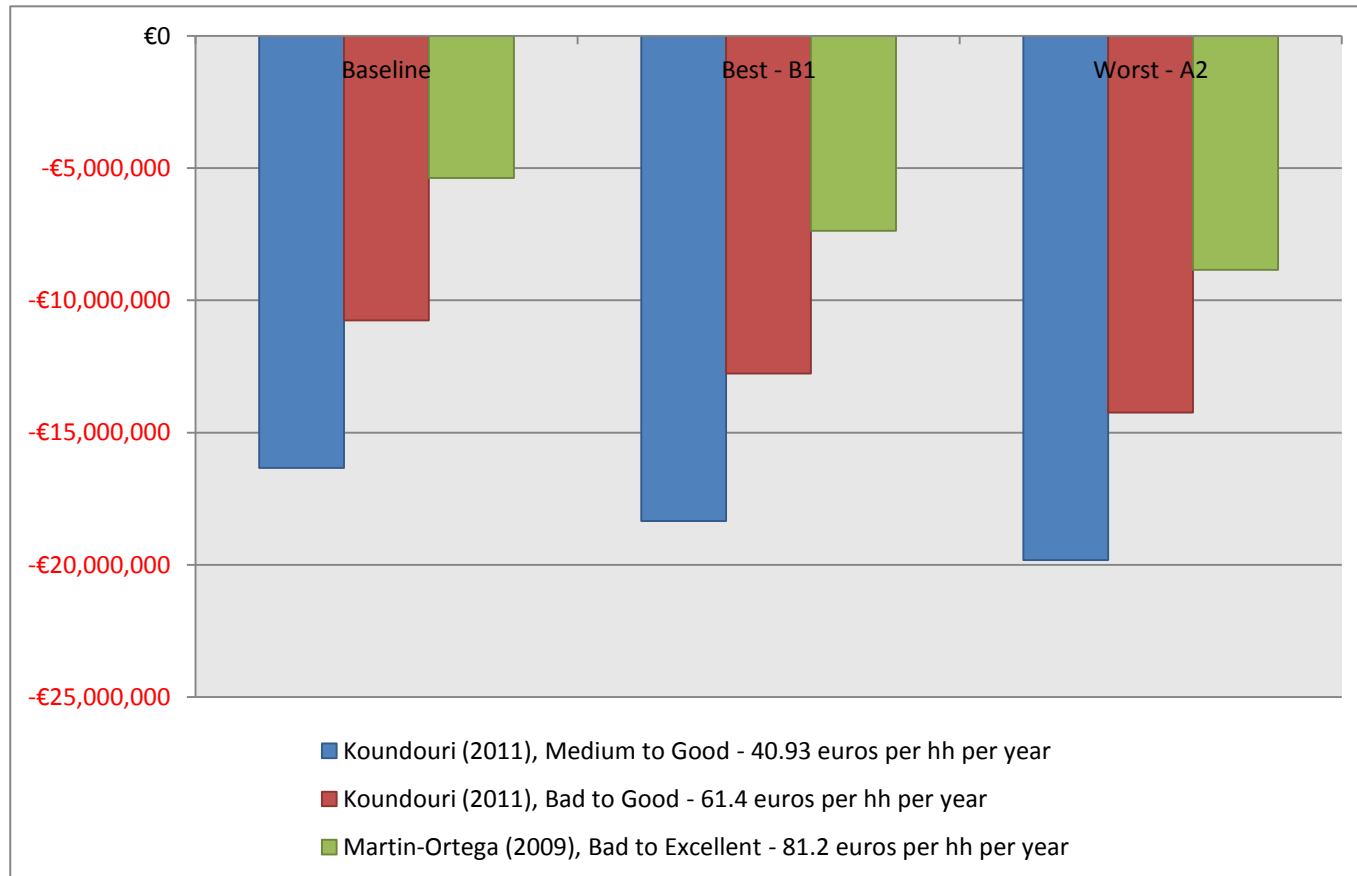


- Benefits are sensitive to income
- Especially benefits related to Habitats and Biodiversity have low (regressive) elasticities
- Poorer households are benefited more than rich ones (proportionately)
- The choice of the benefit is crucial

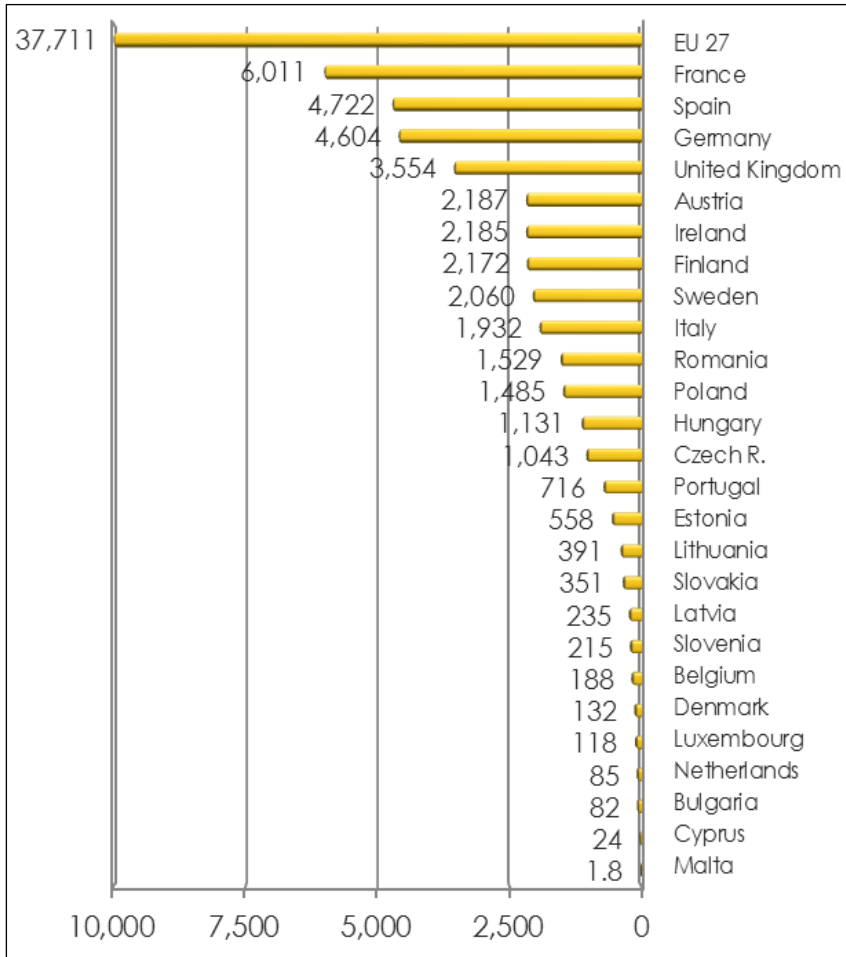


Is it worth undertaking such a project?

Strictly speaking, NO. Due to highly negative Net Present Values



Summary and Lesson Learned



- The agri-environmental policy is very expensive to be left to economists alone (37.4 billion euros in 2007-2013)
- Almost 38 million hectares under agri-environmental agreements

Policy Design and Implementation

- Express policy targets in the same units as the targeted environmental standard
 - Ex-ante assessment of proposed policy with science based nutrient transport models
- Climate change proof the policy
 - Allow for transition to stricter/looser abatement levels if changes are unfavourable/favourable, always with the lowest cost
- Unravel and flag all wider and associated benefits (especially when WFD and Habitats co-exist)
- Take account of disproportionality and affordability effects