

Ocean acidification: Potential socio-economic impacts

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- If there is more CO₂ in the air, then there is more CO₂ in the water too
 - This is known as **ocean acidification** (OA)
 - Unlike the extent of climate change caused by human activities, the chemistry of the ocean acidification is uncontroversial
- *What are the socio-economic implications?*

- Estimates of the socio-economic impact of climate change have largely ignored ocean acidification
- ***This causes several biases***
 - Mitigation of climate change
 - Socio-economic impact estimates and costs of adaptation

- At present, the ocean removes about one-third of anthropogenic CO₂ emissions
 - Climate change is likely to change the buffer capacity of the ocean
 - If the capacity decreases, more CO₂ needs to be reduced elsewhere - if specific targets in emission reduction and/or in atmospheric CO₂ concentration should be met
- ***Climate change mitigation is likely to become more costly***

Mitigation of climate change (2)

- Ocean acidification is only driven by CO₂ emissions
 - This has an effect on the trade-off between GHGs
 - Ocean acidification and climate change operate on different time scales
 - This changes the dynamics of optimal emission control
 - Climate change might be countered by geo-engineering and/or carbon capture and storage (CCS)
 - Some options might have an effect on ocean acidification
- ***Ocean acidification has implications for policy interventions to control climate change***

- Ocean acidification is likely to have a range of impacts on biological and ecological systems including economically important marine resources
 - like fish stocks, shellfish and coral reefs
 - Little quantitative information exists on the impact of ocean acidification on the lower trophic levels
 - Very little information exists on the higher trophic levels that directly matter to us, such as commercial fish but also other species
 - More is known on coral reefs
- ***The impact on human societies depend on ...***
... the vulnerability, resilience and adaptation capacity of specific communities but little is currently known

- Corals are highly productive ecosystems that provide a variety of valuable goods and services to humans
 - direct use values, indirect use values and conservation values
 - There is a substantial literature on the economic values of coral reefs but only one on the impact of ocean acidification
 - What is the total economic impact of ocean-acidification-induced coral-reef-loss?
- ***The potential annual global damage goes up to \$870 billion in the IPCC A1 scenario in 2100 (0.14% of global GDP)***

(Brander, Rehdanz, Tol, van Beukering (2009))

What do we know?

- Mitigation is likely to become more costly
 - Policy interventions to control climate change are affected as well
 - Some first attempts exist putting a dollar value on ocean acidification
 - limited to molluscs (USA) and coral reefs (world)
 - Estimates point to significant economic losses
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- ***Currently, we have only incomplete knowledge of the socio-economic impact of ocean acidification***
 - ***Also, we know little about distributional aspects***

- Further research is required to refine existing damage estimates and to extend the scope of analysis
 - While the initial impact of OA is relatively clear, the eventual impact depends on the complex interaction of many species, and on the goods and services related to them
 - This involves a more integrated research among disciplines
 - Current European and national programmes are relatively limited in size, when compared to the challenges we are facing due to ocean acidification, especially in terms of socio-economic impacts
 - First step: develop a specific database building on the national research activities in ocean acidification
 - Identify gaps and set up a plan for future research



Thank you!

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