



## **Economic Costs of Ocean Acidification: A Look into Potential Loss of Shellfish Production**

D. Narita (1), K. Rehdanz (1,2), R.S.J. Tol (3,4,5,6)

(1) Kiel Institute for the World Economy, Hindenburgufer 66, 24105 Kiel, Germany, (2) Christian-Albrechts-University of Kiel, Department of Economics, Olshausenstrasse 40, 24118 Kiel, Germany, (3) Economic and Social Research Institute, Whitaker Square, Sir John Rogerson's Quay, Dublin 2, Ireland, (4) Institute for Environmental Studies, Vrije Universiteit Amsterdam, De Boelelaan 1087, 1081 HV Amsterdam, The Netherlands, (5) Department of Spatial Economics, Vrije Universiteit Amsterdam, De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands, Department of Economics, Arts Building, Trinity College, Dublin 2, Ireland

Human activity is increasing the concentrations of carbon dioxide in the atmosphere and in the ocean. In the atmosphere, carbon dioxide is a greenhouse gas causing climate change. In the ocean, carbon dioxide is an acid causing ecosystem change. While research on various aspects of climate change has generated an enormous number of studies, ocean acidification has only recently been recognized as a problem. Impact studies are still rare, and estimates of the economic impact are almost absent.

Since acidification of ocean water is primarily driven by the well-known law of chemical equilibrium of carbon dioxide and water, the initial impact of ocean acidification is relatively clear. However, the eventual impact depends on the complex interaction of many species. This fact limits the scope of estimation of resulting changes in economic values. Along with coral reefs, however, shellfish (mollusks) are an exception in that the impact of ocean acidification is relatively well understood because they sit in a relatively low position in the food chain. Estimation of economic impacts of ocean acidification on shellfish production would therefore provide initial hints for economic assessment of ocean acidification in general, as well as more broadly, for economic assessment of climate change. Also, an impact assessment of shellfish has a significant commercial implication in itself, as the value of shellfish produced and consumed worldwide amounts to around 8 billion USD per year (FAO data, 1999-2008 average). At present, however, such analyses are non-existent except for Cooley and Doney (2009), who discuss the issue only in the US context. This study is an initial attempt to fill the research gap by performing an economic assessment of global effects of ocean acidification on shellfish including a partial-equilibrium analysis.