



INTEGRATED COASTAL ZONE MANAGEMENT
AND VALUATION OF SOCIO-ECONOMIC IMPACTS

12 – 13 March 2007 Centro Culturale Don Orione Artigianelli, Venice, Italy



14:30 – 16:30

SESSION 3: Impacts of Climate Change

Chair: Mordechai SHECHTER – University of Haifa, Israel

Guideline for socio-economic valuation of the shoreline

Bengt Rydell, Swedish Geotechnical Institute*, Mats Persson, Lund University

*Corresponding author: Bengt Rydell, Swedish Geotechnical Institute, SE-581 93 Linköping, Sweden, e-mail: bengt.rydell@swedgeo.se, tel. +46 13 20 18 24

Abstract

As a part of the Interreg Messina project, socio-economic analyses have been performed. A guideline has been developed as a tool for the integration of costs and benefits in decision-making on investments in coastal zones. The guideline gives an overview on why, when and how socio-economic valuations of coastal areas, affected by erosion, can be made. The guideline could be used to prioritise areas that need attention due to threatened shorelines and to decide which preventive measures are the most efficient from a socio-economic point of view. The paper also describes a case study which was performed to demonstrate the practical application of socio-economic analysis and valuation in coastal management.

Global Sea-Level Rise and Equity Weighting

David Anthoff¹, Robert J. Nicholls², Richard S.J. Tol³

¹ International Max Planck Research School on Earth System Modelling, Hamburg, Germany Research Unit Sustainability and Global Change, Hamburg University and Centre for Marine and Atmospheric Science, Hamburg, Germany - ² School of Civil Engineering and the Environment and Tyndall Centre for Climate Change Research, University of Southampton, Southampton, UK SO17 1BJ, United Kingdom - ³ Economic and Social Research Institute, Dublin, Ireland Institute for Environmental Studies, Vrije Universiteit, Amsterdam, The Netherlands Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA, USA Research Unit Sustainability and Global Change, Hamburg University and Centre for Marine and Atmospheric Science, Hamburg, Germany

Abstract

Using the FUND model, an impact assessment is conducted over the 21st century for rises in sea level of up to 2-m/century and a range of socio-economic scenarios on a per country basis. While the costs of sea-level rise increase due to greater damage and protection costs, an optimum response in a benefit-cost sense remains widespread protection of developed coastal areas, as identified in earlier analyses. The socio-economic scenarios are also important in terms of influencing these costs. In terms of the four components of costs considered here, protection seems to dominate, with substantial costs from wetland loss under some scenarios. The regional distribution of costs shows a few regions experience most of the costs, especially South Asia, South America, North America, Europe, East Asia and Central America. However, there are some important limitations which suggest that protection may not be as widespread as suggested in the



INTEGRATED COASTAL ZONE MANAGEMENT AND VALUATION OF SOCIO-ECONOMIC IMPACTS

12 – 13 March 2007 Centro Culturale Don Orione Artigianelli, Venice, Italy



FUND analysis. Nonetheless, this analysis suggests that protection is much more likely and rational than is widely assumed, even with a large rise in sea level. Damages are also presented with equity weighting applied to uncover the true welfare loss caused by sea-level rise. Taking the level of wealth of those affected into consideration is shown to increase the estimates of welfare loss by orders of magnitudes when looked at from a developed country perspective, while welfare loss is overstated from a poor countries perspective.

An Economic Valuation of Land Loss Damages Due to Sea Level Rise Induced by Climate Change: The Case of Israel

Nahum Yehoshua, Mordechai Shechter and Noam Greenbaum
Department of Natural Resource & Environmental Management, University of Haifa, Haifa, Israel

Abstract

Sea level rise in the Mediterranean basin is one of the most troubling impacts related to future climate change. Numerous estimates show that the sea level has risen in the past century by 10-25 cm. which is considerable when compared with the rate of sea level rise in the past few thousand years.

Research involving assessing the impacts of sea level rise requires the integration of several distinct fields of knowledge and a profound understanding of complex systems, such as climatic and marine models, geomorphologic systems etc.. It demands, by its nature, making a number of major assumptions concerning future global changes, of which there is still a great of uncertainty. Due to these considerations, many research efforts have recently been directed at creating a synthesis of sea level rise impacts assessments, in order to aggregate the diverse information bases.

The objective of this study was to assess the major impact of sea level rise – manifested principally in land loss due to inundation and erosion - on Israel's Mediterranean coast. Given the specific and rather unique nature of the Israeli coastline, this study has employed specific tools to assess the damages. The economic assessment focuses mainly on valuing the beaches as a public resource for recreation, using methods such as CVM and TCM.

The study followed three stages: First, an assessment of land lost by size and location; second, characterization of the inundated land, and third, monetary valuation of land losses. In the first stage we employed different tools to estimate land loss. First, we had to adjust the estimation tool to the coastal structure, and next had to calibrate the results. Among the tools used were GIS analysis of simple inundation, past measurements of the coast, and traditional tools such as the "Bruun Rule" model. In the characterization stage, we used Ministry of the Interior "Outline Physical Plans", expert judgment, and ecological and cultural appraisal plans to forecast future land uses. In the final stage, we used essentially a benefit transfer procedure to translate and adapt relevant use and WTP data from a number of previous studies, which provided estimates of market and non-market values.

In applying the data to the Israeli coastline scenarios, we relied on widely used global change scenarios associated with such variables as global sea level rise, population

INTEGRATED COASTAL ZONE MANAGEMENT AND VALUATION OF SOCIO-ECONOMIC IMPACTS

12 – 13 March 2007 Centro Culturale Don Orione Artigianelli, Venice, Italy



increases, etc. In addition, we carried out sensitivity analyses, in order to assess the robustness of our own final estimates.

The overall land loss rate estimated in this research is about 10 Km² per 1 meter of sea level rise. The relatively low rate of land loss points to the fact that the Israeli coast, due to its natural geomorphologic nature is of relatively little sensitivity to sea level rise.

The final stage, namely the valuation of economic losses, was conducted using 12 scenarios, based on the different assumptions regarding the three stages of impact assessment. The estimated annual loss is projected to reach about \$ 71.5 million (in a year when the sea level rise reaches its full potential). In present value terms, total loss ranges between \$ 0.25- 2.9 billion (under alternative discount rates). In general, the losses reflect the relatively high losses associated with recreation compared with the (limited) extent of real-estate value loss. This is due to the fact that a good deal of the coastline in Israel is classified as a public good devoted to recreational use, with some land allocated to strategic or military uses, and with limited options for private land development for housing.

Postscript: The economic values of non-market recreational benefits associated with sea-level rise and the methodology used in this research have been recently formed a basis for determining the Coast-use Charges levied by the Ministry of Environmental Protection on various land uses along the coast. The charge is expected to pass the final stages of legislation soon.

Applying Multifunctional and Valuation Approaches to Coastal Uses (including Tourism) and Climate Change

Magdalena A K Muir, Research Associate, Arctic Institute of North America, and Advisory Board Member, Climate, EUCC- The Coastal Union, email: makmuir@ieels.com

Abstract

The European coast is subject to a high degree of competing uses, including agriculture, aquaculture, fisheries, tourism and urban development. Some areas of southern Europe, such as the Mediterranean region, are characterized by a very high dependency on tourism, and increasing and competing human uses.

This high level of coastal uses is occurring at a time when the region is also experiencing a variety of climatic changes, such as changing seasonal and annual precipitation patterns, greater land and sea surface temperatures, and rising sea level. Complex approaches to integrated coastal zone management will be required to address these intertwined issues, which must involve social and economic assessment, supported by appropriate science and monitoring.

The presentation and paper will discuss the application of multifunctional and valuation approaches to sustainable coastal uses in Europe and focus on specific examples such as



ENCORA 1st Thematic Network Conference

**INTEGRATED COASTAL ZONE MANAGEMENT
AND VALUATION OF SOCIO-ECONOMIC IMPACTS**

12 – 13 March 2007 Centro Culturale Don Orione Artigianelli, Venice, Italy

tourism on small islands and coasts throughout the Mediterranean Sea; and tourism, industrial, agricultural and aquaculture in the Venice lagoon and Adriatic Sea.

Preliminary References:

Climate Change and Coast and Beach Management in Europe, case study for EU-funded Coastal Practise Network, 2006.

Moving the Global Oceans Agenda Forward, Marine Scientist, No. 13, 4Q, 2005, at 29 to 31.

Beaufort Sea Large Ocean Management Area Ecosystem Overview and Assessment, Vol 2, 2006.

The Beaufort Sea Partnership: A Strategic Approach for Integrated Oceans Management in the Arctic, 2005.

European and North American Case Studies for Public Participation and Good Practise in the Coastal Zone, International Workshop and Symposium for Participatory Planning Tools and Methods for Sustainable Management of Marine, Coastal and Marine Resources, Sifnos, Greece, June 10 to 13, 2005.

Information and Indicators for Integrated Coastal Zone Management: Canadian Arctic Case Study, Sustainable Tourism and Marine Protected Areas Workshop, Canary Islands, 2005.

Ecosystem-Based Approaches for Conserving Arctic Biodiversity, discussion paper, Arctic Council Arctic Marine Strategic Plan Workshop in October 18 to 20, 2003

Using Integrated Management and GIS Analysis to Understand Impacts and Adaptation to Climate Change for Fish and Marine Mammals in Canadian Beaufort Sea, ACIA International Symposium on Climate Change in the Arctic, November 9 to 12, 2004, in Reykjavik, Iceland.

Using Integrated Management and GIS Analysis to Reduce Oil Spills and Pollution in European Coastal Waters, for Littoral 2004, September 20 to 22, 2004, Aberdeen, Scotland.

Transboundary Watershed and Coastal Management in North America and Europe: Examining the Hudson Bay, Po River and Rhone River Watershed and Adjacent Coasts, for Managing Shared Waters conference in Hamilton, Ontario, June 2002.

Integrated Coastal and Marine Management in Northern Regions: Reconciling Economic Development and Conservation, Journal of Coastal Research SI 36 (ICS 2002 proceedings, March 2002, Templepatrick, Northern Ireland).

Reconciling Economic Development and Marine Conservation and Protection, Focusing on Offshore Hydrocarbon Activities, Shipping and Navigation, Ocean Management Research Network Canada's Oceans: Research and Policy conference, Ottawa, October 25-27, 2002.

Integrated coastal management and marine protection in the Canadian Arctic, 7th Circumpolar Cooperation Conference, August 19 to 21, 2001 in Tromso, Norway.

Comprehensive Land Claims Agreements for the Northwest Territories: Implications for Land and Water Management, book co-published by the Arctic Institute of North America and the Canadian Institute of Resources Law, November 1994.