

## Climate Change at the Baltic Sea Coast – The RADOST Project

The RADOST project's aim is to develop adaptation strategies for the Baltic coastline of Mecklenburg-Western Pomerania and Schleswig-Holstein through a dialogue between research institutions, businesses, public administration and civil society. Another important goal is to minimize the economic, social and environmental harm as well as to capitalize on development opportunities brought about by climate change.

As one of seven selected regions across Germany, it will be funded by the German Ministry of Education and Research (BMBF) within the framework of the ministry's initiative KLIMZUG ("Managing climate change in the regions for the future"). The project duration of RADOST is from July 2009 to June 2014. Please see [www.klimzug-radost.de](http://www.klimzug-radost.de) for further information.



## RADOST Annual Conference 2010 on 24<sup>th</sup> and 25<sup>th</sup> March in Schwerin

The RADOST annual conference will take place on 24<sup>th</sup> and 25<sup>th</sup> March 2010 in Schwerin. The conference is conducted under the auspices of the Ministry of Economics, Labor and Tourism of Mecklenburg-Western Pomerania and addresses a wide array of parties in the German Baltic Sea region and beyond. The conference is aimed

at participants affected by the implications of climate change, those who conduct research in this field and are possibly already working on solutions or those who simply want to learn more about this issue. Interactive work groups will give advice on the challenges and adaptation options for specific sectors such as tourism, coastal protection, nature conservation, ports and maritime economies. Technical papers will shed light on the state of the research on the regional consequences of climate change and the corresponding work program in

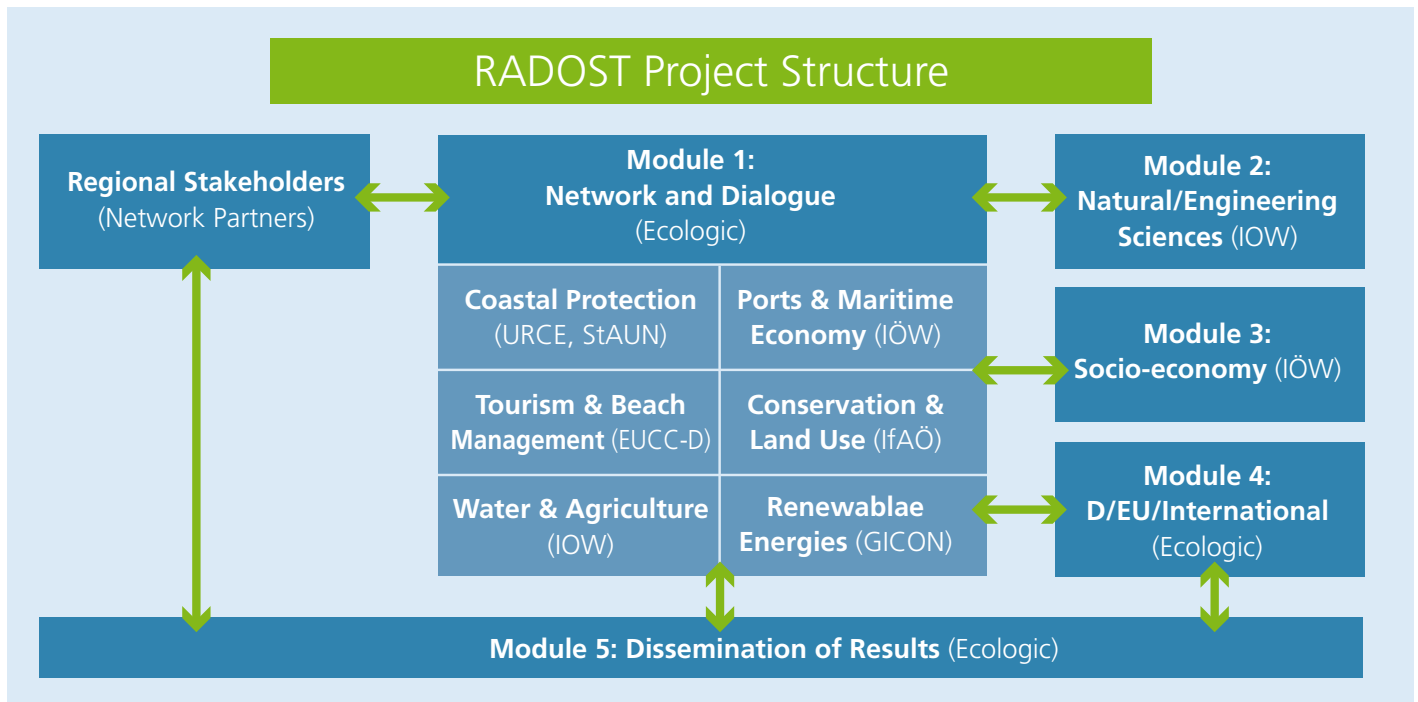
RADOST. Updates on practical examples from the German Baltic Sea coast and international partner regions in the USA and in the European Baltic Sea region complement the program.

You can find the schedule of the conference through the following link: [www.klimzug-radost.de/termine/jahreskonferenz-radost-schwerin](http://www.klimzug-radost.de/termine/jahreskonferenz-radost-schwerin). Prior to the annual conference, an informative discussion with the press will take place on the premises of Invest Mecklenburg-Vorpommern GmbH in Schwerin.

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# The RADOST Project



## RADOST – Project Structure

### Module 1

(Network Building and Dialogue)

constitutes the heart of the undertaking and provides a gateway between research and practice. Sector-related and cross-sectoral issues are addressed in various forms of exchange and cooperation. The state of research activities is continuously assessed according to the needs of regional stakeholders, and problem solving approaches, including concrete applications, are being developed. The focus issues are: coastal protection; tourism and beach management; water management and agriculture; ports and maritime economy; nature conservation in relation to land use; energy (esp. renewable energies).

### Module 2

(Research in Natural and Engineering Sciences)

provides essential data on climate change and includes expanded studies in the fields of hydrodynamics/sediment transport, water quality as well as ecology

and biodiversity. Leading simulation models are joined together in RADOST. Data from existing climate scenarios are complemented by information about changes in sea state, water levels and currents, as well as nutrient inputs and changes in water quality.

### Module 3

(Socio-economic Analysis)

deals with the changes in the regional economic structure anticipated with climate change and analyses the potential effects on income and employment as well as the costs and benefits of various adaptation options.

### Module 4

(National and European Political Setting/ National and International Exchange)

covers the national and international exchange of information and experiences as well as the adjustment of regional adaptation strategies to political developments on the national and European level.

### Module 5

(Communication and Dissemination of Results)

distributes project results targeted to various groups of users both in the region as well as to a national and international audience.

## Implementation Projects

To illustrate the economic opportunities of innovative responses to climate change, 16 implementation projects with local partners are envisaged. Among the project topics are: innovative approaches to coastal protection; adaptation strategies for ports and tourism; a guide to future aquaculture; route-specific optimization of ship design; combining coastal protection constructions with geothermal energy generation.



## Focus Areas

Research, dialogue and implementation are concentrated in six geographical focus areas: Kiel Bay, Lübeck Bay, Rostock, Fischland, Adlergrund/Lubmin, Oder Estuary.

## Project Partners

The project is coordinated by the Ecologic Institute, Berlin. The core consortium includes the following partners:

Company for Environment & Coast, Kiel; CRM Coastal Research & Management, Kiel; EUCC – The Coastal Union Germany, Rostock-Warnemünde; GICON – Großmann Ingenieur Consult GmbH, Rostock; H.S.W. Bureau for applied and environmental geology GmbH, Rostock; Institute of Applied Ecology (IfaÖ), Neu Broderstorf; Institute for Coastal Research at the GKSS Research Centre, Geesthacht; Institute for Ecological Economy Research (IÖW), Berlin; Johann Heinrich von Thünen Institute (vTI) – Federal Research Institute for Rural Areas, Forestry and Fisheries, Braunschweig; Landesamt für Landwirtschaft,

Umwelt und ländliche Räume (State Office of agriculture, environment and rural areas of the State of Schleswig-Holstein – LLUR), Flintbek; Landesbetrieb Küstenschutz, Nationalpark und Meeresschutz Schleswig-Holstein (Schleswig-Holstein Agency for Coastal Defence, National Park and Marine Conservation – LKN), Husum; Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB), Berlin; Leibniz Institute for Baltic Sea Research, Warnemünde (IOW), Rostock-Warnemünde; Staatliches Amt für Umwelt und Natur (State Agency of Environment and Nature – StAUN) Rostock; University of Kiel, Department of Geography; University of Rostock, Department of Coastal Engineering (URCE).

## International Partners

The regional dialogue will be complemented by a national and international exchange of information. RADOST involves international partner regions in Denmark, Latvia and Finland, on the Polish Baltic Sea coast, the Slovenian and Moroccan Mediterranean coasts and on the eastern coast of the United States.

# Regional Activities

## Extractive Polyculture in the Kiel Fjord – Water Quality and Future Perspectives on Aquaculture



The harvesting of brown algae removes nutrients from the water bodies, which, in high concentrations, can upset the ecologic balance.

In January 2010, the company CRM Coastal Research & Management (Kiel) started a new project to combine cultures of algae and mussels in the Kiel Fjord, funded by the Deutsche Bundesstiftung Umwelt (German Federal Environmental Foundation). Neither species requires additional nutrients for their cultures; they gather nutrients and phytoplankton from the seawater and therefore counter the eutrophication of the coastal waters. The shores of the Baltic Sea are among the most densely populated and economically used coastal regions in the world. As a consequence of

## Kick-off Meeting of the RADOST Focus Network "Conservation and Land Use"

On 26<sup>th</sup> January 2010, a first working meeting was held with regional stakeholders at the Institute for Applied Ecology (IfAÖ) in Broderstorf regarding the research focus of the IfAÖ in RADOST.

The status of the multiple human uses of the natural environment and its functions

this intense cultivation, the nutrient inputs here are particularly high.

A part of the project is dedicated to examining the applicability of mussels for aquaculture feed. The goal is to produce long-chain fatty acids from sustainable sources in the future. Today these acids which are necessary for fish production are usually obtained from fish meal or fish oil. To this end, CRM is currently building a ca. 6000 m<sup>2</sup> site on the west shore of the Kiel Fjord in the waters bordering Holtenau.

For comparative purposes, more research is being conducted at the fish farm of "Kiel Salmon Trout" on the east shore of the Kiel Fjord. A comparison between these two locations provides the RADOST project with particular advantages: the fish farm is located on the efflux area of the cooling water of the Kiel joint-venture power plant, which warms the surface water level there by ca. 4°C. Therefore, the conditions that correspond to a rise in temperature due to climate change can be simulated here to some extent; at the same time, growth, settling rates and product quality can be compared to the new location on the west shore. CRM wishes to use these location possibilities for the implementation project "Future Strategies for Aquaculture – Focus Area Kiel Fjord" within RADOST.

[www.crm-online.de](http://www.crm-online.de)

in the context of climate change was assessed under the topic of "Conservation and Land Use".

With the topic „Ecology and Biodiversity“, the ecological development of the natural ecosystem of the German Baltic Sea in relation to climate change was presented. Around 25 representatives of ministries and agencies at the federal and regional levels, energy companies, conservation organisations, research institutions and consultancies were present and participated in a lively discussion.

## Kiel Fjord

Baltic Tourism Network for Climate Change Adaptation is launched

On 2<sup>nd</sup> February 2010, the Baltic Tourism Network for Climate Change Adaptation was set in motion in Schöneberg in the district of Plön, Schleswig-Holstein. The network's objective is to take advantage of opportunities and limit risks associated with climate change in a joint effort. It involves many communities in the Kiel Bay area, scientists, as well as tourism, consumer and nature conservation associations. At the very



View of the Kiel Fjord from Laboe

first meeting, two foci of action emerged. First, the preservation of beaches and of the tourist infrastructure in the face of climate change presents significant financial challenges for the communities. Second, much interest was expressed in a label for a "climate-friendly vacation region" associated with specific offers. It is planned to move on to concrete implementation steps at the next meeting, which will take place on 23<sup>rd</sup> March 2010 in Dänischenhagen.

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## Kick-off for RADOST Pilot Projects for Drainage Management

Since the 1990s, the expansion of wastewater treatment plants, the reduced application of fertilizers and the use of phosphate-free washing detergents have all contributed to reduced inputs of nutrients into water courses. Despite these efforts, excessive amounts of pollutants such as phosphorous and nitrogen are continually released into water courses, and nutrient inputs from agriculture remain on a nearly constant level. The excessive amounts of pollutants lead to the overgrowth of aquatic plants and algae.

The majority of nutrient inputs in the surface waters of the Baltic Sea watershed derive from underground drainage systems. This is due to the high share of drainage systems set up on arable land and grasslands near groundwater. In addition, drainage waters are discharged quickly into surface waters through drainage pipes retaining only a limited degree of nutrients and pesticides.

A meeting of public authorities, stakeholders and research institutes took place on 7<sup>th</sup> January 2010 in Berlin to discuss possibilities to reduce the input of nutrients and pesticides through drainage. So far, measures to reduce such pollutants from drainage systems are not established and are only tested to a limited extent in Germany.

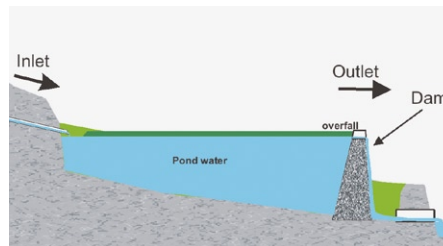
RADOST supports three pilot projects in cooperation with the State Agency for the Environment, Nature Conservation and Geology of Mecklenburg-Western Pomerania (LUNG), the University of Rostock and other stakeholders such as water and soil associations.

The projects focus on:

- (1) Retention basins, which are positioned between the drainage outlet and the surface water and enable the reduction of nutrient inputs through denitrification, plant absorption and sedimentation.
- (2) Controlled drainage systems which allow drainage through the regulation of water

levels only at times when surfaces can be worked and inspected (Spring and Autumn). This reduces the leaching of nutrients by holding back water.

(3) Constructed Wetlands, which can use water gathered from the drainage ditches to irrigate arable land, thus enabling the use of the same area for both water retention and crop yields. Currently discussed options are the cultivation of cold-resistant rice varieties and the use of biomass in biogas plants.



Scheme of a retention pond at the outlet of a tile drainage system

An important conclusion of the meeting was that the first two pilot projects will be led by LUNG in Mecklenburg-Western Pomerania. The implementation of the third pilot project is currently under review by the University of Rostock. The results of these retention possibilities will be used in RADOST and the surface potential will be calculated using the MONERIS model. Furthermore, a cost-benefit analysis will be conducted within RADOST to evaluate the efficiency of these measures compared to their costs.

## Geographic Information System (GIS) for RADOST online

With the Geographic Information System (GIS), the company GICON-Großmann Ingenieur Consult provides a tool for the illustration and evaluation of all space-defined results of the entire project RADOST available.

On the one hand, the GIS serves as a platform for the publication of all results of all RADOST sub-projects during and after

the project's duration and, on the other hand, performs the function of a planning tool during the execution of the project. This way, GIS data and their attribute data can be displayed, retrieved and evaluated in different combinations, even if they have different origins. The GIS is released through the RADOST website

<http://klimzug-radost.de/daten>

## Stakeholder and Institutional Analysis in RADOST

Climate adaptation on the Baltic coast – for and with whom? These questions were discussed by the Institute for Ecological Economy Research (IÖW) and the Ecologic Institute on 11<sup>th</sup> and 12<sup>th</sup> February 2010 with RADOST project partners at the workshop at the Staatliches Amt für Umwelt und Natur (StAUN) (State Agency of Environment and Nature) in Rostock. This workshop was an important step in the analysis of stakeholders



Jesko Hirschfeld/IÖW

and institutions. In four consecutive focus groups, the stakeholder structures for various themes that reflect the main topics of the RADOST project were examined: water management and agriculture, conservation/land use and renewable energies, coastal protection and maritime economies as well as tourism and beach management. On the basis of regional contacts built up over many years by the invited partners from the RADOST project, a comprehensive overview of stakeholders affected by climate change on the Baltic coast was compiled. Next, the relationship of the stakeholder groups to one another was described and the network of the stakeholders' relationships was depicted through graphics. The analysis provides valuable starting points for the building up of the RADOST network, within which possible adaptation strategies for the German Baltic coast will be developed and discussed in coming years.

A television report of this meeting was broadcasted by TV Rostock on 16<sup>th</sup> February 2010. This report can be viewed on [www.tvrostock.de](http://www.tvrostock.de) in the archive section, search keyword: RADOST.

# International Activities

## RADOST Side Event in Copenhagen

On 15<sup>th</sup> December 2009 the Ecologic Institute hosted a dialogue with international experts on regional adaptation actions for coastal areas as a complementary event to the United Nations Climate Change Conference in Copenhagen. Examples of practical applications of research results within the project RADOST, presented the starting point of the discussions.



The plenum comprised a multitude of geographic regions spanning Europe, West Africa, South Asia and North America uniting representatives from governmental and non-governmental organizations. The discussion centered on local implementation and good practices in coastal areas and the prerequisites for international exchange and dissemination. Much attention was given to the operationalisation of regional adaptation and resilience concepts, to regional adaptive governance processes and strategies and to the role of adaptive learning processes.

Presentations by Benno Hain (German Federal Environment Agency - UBA) and Annette Münzenberg (German Aerospace Center -DLR, Project Management Agency) focused on overarching strategic approaches to adaptation in Germany. Examples of envisaged practical applications in RADOST were presented by Grit Martinez of Ecologic Institute.

Delegates representing the Bangladesh Government at the international climate change negotiations, Giasuddin Ahmed Choudhury and Emaduddin Ahmed, presented adaptation projects in Bangladesh, a

country which is dramatically threatened by sea level rise and increased flooding risks. They underlined the importance of 'partnership at work' with projects such as RADOST. Rob Swart (Wageningen University / ALTERRA, the Netherlands) complemented the picture from an industrialized country's experience.

<http://ecologic.eu/de/3126>

## Transatlantic Media Dialogue regarding Climate Policy in Europe and the US

As part of the Transatlantic Climate Bridge, the Ecologic Institute organized a media dialogue, preceding the UN climate conference in Copenhagen, at which the most important climate and energy policies of Germany and the USA were discussed. The exchange took place from 9<sup>th</sup> to 11<sup>th</sup> November 2009 near Washington, DC on the Chesapeake Bay and brought together a total of 25 German and American journalists and climate experts. Part of the topic of the media dialogue was



At the visitor center of the Chesapeake Bay Environmental Center (CBEC): Vicky Paulas clarifies the effects of climate change on the Chesapeake Bay.

also the specific local consequences of climate change: an excursion to the shore of the Chesapeake Bay clarified the consequences of sea level rise in the region. There, experiences and concepts from regional mitigation projects between the Chesapeake Bay Environmental Center (CBEC), represented by Vicky Paulas, and RADOST project leader Grit Martinez were exchanged.

The Chesapeake Bay, together with the Albemarle-Pamlico Sound region, is one of two partner regions of the RADOST project on the East Coast of the USA.

For more information

<http://ecologic.eu/de/3033>

## BaltCICA:

1<sup>st</sup> International Conference discusses Stakeholder Work

The conference of the INTERREG IVB project „BaltCICA - Climate Change: Impacts, Costs and Adaptation in the Baltic Sea Region“ took place from 26<sup>th</sup> to 27<sup>th</sup> January 2010 in Kalundborg, Denmark. Katherine Richardson (University of Copenhagen and Chair of the Climate Commission, Denmark), Juergen P. Kropp (Potsdam Institute for Climate Impact Research), Andre Jol (European Environment Agency), Povl Frich (Danish Information Center for Climate Change Adaptation under the Ministry of Climate and Energy) and Philipp Schmidt-Thomé (Geological Institute Finland) presented their views on climate change adaptation in Europe to the public. In the following parallel events, scientific and spatial aspects of climate change adaptation as well as initial strategies for the stakeholders' work were discussed. The EUCC - The Coastal Union Germany (Die Küsten Union Deutschland e.V.) is a BaltCICA project partner and is responsible for the issue of Baltic Sea tourism. Methods for successful collaboration with stakeholders developed in BaltCICA will also be applied in the RADOST project.

The next international BaltCICA conference will take place in May 2011 in Bergen, Norway. More information at

<http://baltcica.org/>.

# Publications

## Focus Topic Tourism

Jellyfish on the German Baltic Sea coast:  
Thesis published

A graduate student at the University of Rostock examined in her final project the occurrence, perception and consequences of jellyfish on the German Baltic Sea beaches. Aside from the investigation of marine issues, extensive surveys of bathers were conducted in the summer of 2009. Additionally, a leaflet about the jellyfish species in the Baltic Sea was created, the printing of which was supported by the EUCC – The Coastal Union Germany. For the coming season, a new edition of the information sheet is being planned, to be distributed by health resorts to life guards, beach visitor and bathers.



The results of the thesis provide data for the RADOST focus topic "Tourism and Beach Management," because the occurrence of jellyfish on German coasts is increasingly being linked with climate change. Although this linkage has not yet been scientifically discussed, a sensitive approach to and differentiated engagement with the topic of seaside tourism in the future are quite relevant.

The thesis was published in the series of reports of the project IKZM-Oder and can be retrieved from the EUCC-document database.

(Baumann, S. Quallen an deutschen Ostseeküsten - Auftreten, Wahrnehmung, Konsequenzen. EUCC - Die Küsten Union Deutschland e. V., Rostock, 2010. <http://databases.eucc-d.de/plugins/documents/>)

## Coastline Reports

Articles on the effects of climate change on Baltic Sea tourism

In the combined context of the projects RADOST and BaltCICA (Climate Change: Impacts, Costs and Adaptation in the Baltic Sea Region), the authors Susanne Schumacher and Nardine Stybel (both of the EUCC-Deutschland) researched the effects of climate change on Baltic Sea tourism and compiled examples for international and national adaptation strategies. The results of this have now been published in the series "Coastline Reports," which serves the distribution of project results in coastal research and coastal management.

(Schumacher, S., Stybel, N.. Auswirkungen des Klimawandels auf den Ostseetourismus - Beispiele internationaler und nationaler Anpassungsstrategien. In: EUCC - Die Küsten Union Deutschland e.V.. International approaches of coastal research in theory and practice. Coastline Reports (13), pp. 23-46. EUCC - The Coastal & Marine Union, Leiden, 2009.)

## Effects of Climate Change on the Baltic Sea Ecosystem

In a model study of the consequences of various climate scenarios for the Baltic Sea ecosystem, the regional significance of climate change is becoming clear. The two climate scenarios A1B and B1 were simulated with a three-dimensional Ecosystem model for the next 90 years for the Baltic Sea. The results show that the anticipated warming of the Baltic Sea will amount to 1-4 °C. According to this model simulation, the salinity and winter ice cover will lessen. The Cyanobacteria bloom ("blue-green algae bloom") season will lengthen and start earlier in the year. This model study for the entire Baltic Sea serves as a prerequisite for further investigations of the effects of climate change along the German Baltic coastline in RADOST. The author, Dr. Thomas Neumann of the Leibnitz Institute for Baltic Sea Research, Warnemünde (IOW), will adjust the model to the coastal waters further in the coming years.

For more details: Thomas Neumann: Cli-

mate-change effects on the Baltic Sea ecosystem: A model study. *Journal of Marine Systems*, in press.

[www.sciencedirect.com/science/journal/09247963](http://www.sciencedirect.com/science/journal/09247963)

## Dinner Dialogue on Activity of the U.S. National Academies Committee on America's Climate Change Choices

Preceding the RADOST annual conference in Schwerin, the Ecologic Institute ([www.ecologic.eu](http://www.ecologic.eu)) will host a dinner dialogue on 23<sup>rd</sup> March 2010 concerning the activity of the U.S. National Academies Committee on America's Climate Change Choices (<http://americasclimatechoices.org>).

Donald F. Boesch, professor for maritime sciences and president of the Center for Environmental and Estuarine Studies at the University of Maryland, is the guest speaker at the event. The dinner dialogue takes place at the offices of the Invest in Mecklenburg-Vorpommern GmbH, the economic developmental fund for the federal state of Mecklenburg-Western Pomerania. The expansion of the international exchange of information and observations concerning climate change and coastal region management will be at the heart of the dinner dialogue.

## Events

Continents under Climate Change  
Conference on the Occasion of the 200th Anniversary  
of the Humboldt-Universität zu Berlin  
21–23 April 2010, Berlin, Germany  
www.hu-berlin.de/climatechange2010

5<sup>th</sup> Global Conference on Oceans, Coasts and Islands  
3–7 May 2010, UNESCO, Paris, France  
www.globaloceans.org

4<sup>th</sup> International Meeting Acting Together for the Blue Planet  
9–12 May 2010, Nausicaa, Boulogne sur mer, France  
www.4thinternationalmeetingwon.over-blog.com

Implementing adaptation to climate change  
at regional level  
10–11 June 2010, Darmstadt, Germany  
www.klara-net.de

6<sup>th</sup> Study Conference on BALTEX  
14–18 June 2010, Miedzyzdroje, Island of Wolin, Poland  
www.baltex-research.eu/wolin2010

2010 International Climate Change Adaptation Conference –  
Climate Adaptation Futures  
29 June – 1 July 2010, Gold Coast, Queensland, Australia  
www.nccarf.edu.au/conference2010

Workshop “Multilevel Governance and the Baltic Sea”  
August 2010, Stockholm, Sweden  
www.neln.life.ku.dk

International summer school on  
“Climate Change in the Baltic”  
5–18 September 2010,  
Leibnitz Institute for Baltic Sea Research,  
Warnemünde, Germany  
www.io-warnemuende.de

The International Conference  
“Deltas in Times of Climate Change”  
29 September – 1 October 2010, Rotterdam, Netherlands  
www.climatedeltaconference.org

## Imprint

### Overall coordination



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ASA-Multimedia; page 4 right: Christoph Corves; page  
7: Wolf Wichmann

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## Project Partners

