

## Artificial Reefs as a Coastal Protection Measure and Diving Area

“Artificial reefs: coastal protection, underwater habitat and tourist attraction?” – This topic was the focal point of discussion for the Climate Alliance Kiel Bay (KBKB) at a Workshop in Kiel on 15 February 2010. Professor Horst Sterr, cofounder of the KBKB presented the idea of developing artificial reefs that will simultaneously serve as new habitats for the animal and plant species of the Baltic Sea as well as create interesting new diving areas. As part of the KBKB project ZuM Strand (Future Beach Management), a corresponding concept is being developed with the goal of jointly developing alternatives for coastal and

beach conservation that not only promote climate change adaptation but also make the region more attractive to tourists.

Dr. Lothar Schillak of the MarILim Association for Aquatic Research and Investigations gave an introduction into the history of artificial reefs and presented the steps necessary to implementing these in the Baltic Sea. Dr. Kai Ahrendt of the Company for Environment and Coast presented the first results of his feasibility study. The study analysed which locations should be considered for artificial reefs

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## Meadows and Forests in the Baltic Sea RADOST Event at the LLUR



A field of seaweed in the Baltic Sea

„Meadows and Forests in the Baltic Sea“ – „*Zostera marina* und *Fucus vesiculosus*“ or more simply put, “Seaweed and Bladderwrack” was the source of lively discussions at a RADOST event on 3 March 2011, organised by the State Agency for Agriculture, Environment and Rural Areas of Schleswig-Holstein (LLUR).

The topic attracted not only biologists and experts on sea ecology to the LLUR in Flintbek: approximately 60 representatives from government, science, business and civil society followed the lectures on these green, brown and red seaweeds with great interest. The lectures covered everything from the change in and added value of seaweed and bladderwrack to environmental education.

Dr. Ivo Bobsien of the LLUR spoke to the participants about the biological characteristics of *Zostera marina* and *Fucus vesicu-*

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*losus* and what important functions these plants serve today, such as being biological indicators of water quality. Other RADOST representatives informed the participants about possible developments in the Baltic Sea related to climate change and nutrient loads as well as the possibility of specifically implementing “meadows and forests” as an underwater biotechnological coastal protection measure. In this way, seaweed and bladderwrack could reduce the energy from waves and currents, as seaweed helps to stabilise sandy bedrock.

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# Regional Activities

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in view of morphological prerequisites, position to the coastline and other factors. Within the project ZuM Strand, the main objective of an artificial reef is to counteract the accelerated beach erosion caused by climate change. Elke Körner of the Schleswig-Holstein section of BUND – Friends of the Earth Germany brought up the question of whether artificial reefs will also bring about increased biodiversity in the Baltic Sea or whether they are simply an encroachment on its habitat. Those in attendance, amounting to about 70 participants, showed just how great the interest in this topic is.

Although even a warming climate will not create the necessary conditions for the

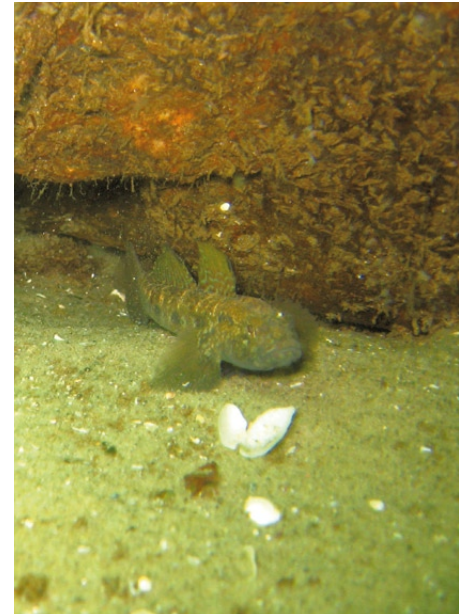
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Philipp Schubert of the Leibniz Institute of Marine Sciences at the University of Kiel (IFM-GEOMAR) spoke about tourism potential in the Baltic Sea. The scientist and diving enthusiast introduced “Baltic Sea Oases” and explained what makes these places attractive for the diving tourist industry: the presence of algae and seaweed, alongside artificial structures such as breakwaters and ship wrecks, plays a singular role.

Other presentations addressed the significance of seaweed and bladderwrack as a habitat for fish in addition to their use as food, cosmetics or pharmaceutical products for humans. While the potential benefits of seaweed are great, the practical implementation of new possibilities for added value, however, must first overcome major challenges. This is especially noticeable with the benefits of algae as a source of bioenergy. Although only twelve hectares of planted algae are needed to cover the energy needs of ten households (ca. 30 hectares of corn are needed for the same amount of energy), the costs are significantly greater, and the development of potential seaweed cultivation is proving to be problematic.

development of coral reefs in the Baltic Sea, artificial reefs can nevertheless restore habitats destroyed by Steinfischerei (the removal of large stones from the sea floor) in some regions, creating attractive diving areas and therefore also increasing the potential for tourism. Whether artificial reefs can actually meet the demand of reconciling economic use for coastal protection and tourism with ecological benefits will only be known after these reefs are implemented.

On 16 March 2011, a television report on this workshop by NDR was shown in Schleswig-Holstein. The report can be found (in German) at [www.ndr.de/flash/mediathek/index.html](http://www.ndr.de/flash/mediathek/index.html) under the title “Künstliche Riffe.”



The black gudgeon on the floor of the Baltic Sea

In closing lectures, efforts made by RADOST network partners to make younger generations aware of sea, biodiversity and climate change issues by means of environmental education were presented. All participants agreed that major steps in the development of education as well as in research and the practical implementation of measures for the conservation and environmentally

sound exploitation of marine resources are still needed. The workshop and other RADOST activities (see also the article “Stones for the Algae Forest” in this newsletter) will also contribute to this.

The workshop presentations can be found here: <http://www.klimzug-radost.de/termine/wiesen-und-waelder>



A field of seaweed in the Baltic Sea Seaweed cover stabilises the sandy sea floor and thus protects it from erosion.



# Rocks for the Algae Forest

## Hydro-Acoustic Mapping in the Bay of Lübeck Focus Area

In the stony shallows of the Baltic Sea, bladderwrack (*Fucus vesiculosus*) grows in vast populations. These algae forests constitute a unique habitat for a variety of different organisms. Rocks are essential for the survival of bladderwrack, since these brown algae, which have an adhesive disc instead of roots, can only attach themselves to hard surfaces.



Bladderwrack (*Fucus vesiculosus*) is extremely prevalent in the Baltic Sea. It grows predominately on rocks and provides a home for particularly species-rich plant and animal communities.

Since 1950, the bladderwrack population in the western Baltic Sea has been reduced in some areas by up to 95 percent. While this type of algae used to settle in depths of up to 10 meters, today it is rarely found in waters deeper than 2-3 meters. Reasons for this retreat are assumed to be nutrient surplus as well as invertebrates' (marine isopods) feeding on the plant. In addition, the practice of "stone fishing" (*Steinfischerei*, the removal of large stones from the sea floor) has, over the years, removed large amounts of rock from the coastal areas and

thereby significantly reduced the habitable surfaces of bladderwrack.

Among the goals of the EC Water Framework Directive is to reach a good ecological condition in the coastal waters of the Baltic Sea by the year 2015. The size of the bladderwrack population and the depth of the water it grows in play a central role in

the evaluation of water quality. If the water quality were improved, bladderwrack could settle once again in its original habitat in deeper waters. An important condition for this, however, is the presence of appropriate and sufficiently dense stone surfaces, since bladderwrack seedlings usually only survive directly next to their parent plants.

Besides currently creating a population map, the State Agency for Agriculture, Environment and Rural Areas of Schleswig-Holstein (LLUR) is investigating other possible loca-

tions for bladderwrack in the RADOST implementation project "Quality components of the Water Framework Directive – fostering sea grass and bladderwrack populations."

Historical investigations have shown that bladderwrack once grew in great numbers on the stone reef near Brodten in the RADOST focus area of the Bay of Lübeck. Contemporary witnesses, however, also reported that the central and northeastern parts of the reef were basically "fished clean" by *Steinfischerei* by 1965. Today, the bladderwrack population can only be found directly at the water's edge, and the actual stone density in this area is unknown.

On behalf of the LLUR, the Institute of Geosciences at the University of Kiel mapped the central areas of the stone reef with side-scan-sonar in June 2010. With this hydro-acoustic method, geographical positions, areas and sediment distribution can be determined quite exactly. Even individual rocks can be identified and measured, and the average number of rocks in a given area can be determined. A diving robot equipped with a video camera was also used to provide additional assistance.

Off the coast of Brodten today there can be found an abrasion platform, which is an after-effect of the erosive removal of the ice-age cliff that once stood there. Today, waves and currents continue to slowly carry sediment away and, in so doing, set hitherto covered rocks and blocks of stone free. This continuing process partially offsets the losses brought about by the effects of *Steinfischerei* over the years in the area of this platform. The rocks and blocks of stone that are now being uncovered offer bladderwrack an appropriate substrate upon which to grow. After an analysis of potential conditions for bladderwrack growth, population-supporting measures could enable the algae forests to once again grow at deeper water levels in the Bay of Lübeck.

# Regional Activities

## Workshop “Municipal Coastal Protection under Modified Climate Conditions”



Participants of the workshop at Timmendorfer Beach

Will tried and tested methods of coastal protection prove effective in the future, given the changing climate? The participants of the workshop “Local Coastal Protection,” which took place on January 18th in Timmendorfer Beach (Timmendorfer Strand), dealt precisely with this question. More than 50 individuals from the German Baltic Sea area took part in the workshop, which was jointly organised by the University of Rostock and the Tourism Board of Schleswig-Holstein. Among the participants present were representatives of communities and the tourism industry, engineers, landscape architects, scientists and representatives of non-governmental organizations as well as coastal protection authorities.

The host organizations endeavored first and foremost to stimulate an exchange of ideas among the German Baltic Sea coastal communities about the implementation of concrete protection and adaptation measures as well as to report on the experiences of different coastal areas in Schleswig-Holstein and Mecklenburg-Western Pomerania. Anticipatory protection measures and adaptation to climate changes are indispensable to the Baltic coast, two-thirds of which is now endangered by erosion. Furthermore, the ca. 180,000 people living on the German Baltic Sea coast must be protected from potential flooding dangers.

Damages to coastal protection facilities and the reduction of beach area useable by tour-

ists have encouraged the communities to search for adequate solutions that combine protective functions with the added value of tourism. The example of Timmendorfer Beach shows that coastal protection can go hand in hand with spatial planning, nature conservation and tourism. The public’s initial and continually active participation in the planning and decision-making processes is, for this, particularly important.

### Further information (in German):

[www.auf-kw.uni-rostock.de/veranstaltungen/workshop-kommunaler-kuestengewasserbau/](http://www.auf-kw.uni-rostock.de/veranstaltungen/workshop-kommunaler-kuestengewasserbau/)



# The Beach as Air Conditioner – Cooling and Heating through Thermal Use of Sea Water

On hot summer days, air conditioners run at full speed. On such days, a jump in the Baltic Sea results in a much needed cool off. Through the construction of geothermal energy collectors or other heat exchangers in areas near the beach or in coastal protection structures, buildings near the coast could be cooled indirectly through sea water in the summer time and heated in the winter time. Direct thermal use of sea water is also possible through well facilities.

The feasibility and cost-effectiveness of such a geothermal energy facility is being investigated by the RADOST implementation project „Coastal Protection and Geothermal Energy.“ To this end, five sensors will be installed on the beach of Warnemünde in March 2011 to measure and document underground temperatures and further para-



Position of the measuring section on Warnemünde Beach meters for an entire year. Based on these data, a model design for a combination of coastal protection structures with geothermal energy facilities will be developed. Investors planning or building in coastal surroundings will then be able to use this design as a model or adopt it to their own projects.

**More information on the project here:**  
[www.klimzug-radost.de/en/project/info/implementation-projects/coastal-protection-and-geothermal-energy](http://www.klimzug-radost.de/en/project/info/implementation-projects/coastal-protection-and-geothermal-energy)

## Climate Adaptation in Coastal Regions: RADOST Workshop on Coastal Tourism in Hamburg

A workshop on “Coastal Tourism,” led by the German federal state of Mecklenburg-Western Pomerania and the project RADOST, will take place on 31 March 2011 in Hamburg. The workshop is aimed toward private and public representatives of the tourism industry as well as representatives of municipalities, regional planning and business. The event is part of the regional conference “Climate Adaptation in the Coastal Region” of the German government and the north German coastal states, which will take place on 30 and 31 March 2011. The central question to be discussed by the workshop is: “Coastal regions in the face of climate change – a future point of tension between tourism and coastal and environmental protection?”

In the workshop, EUCC – the Coastal Union Germany, together with other RADOST project partners, will show possible future developments for tourism that could be brought about by climate change, evaluate these according to their relevance for the tourism sector and discuss with partners with which strategies and measures the ef-



Blue skies and expansive beaches will continue to be expected by Baltic Sea tourists in the future.

fects of climate change can be confronted. This process will shed light not only on various areas and regions but also on the topics of beach management, coastal protection, nature conservation and energy (especially geothermal energy).

Simultaneously occurring workshops at the regional conference deal with the topics of “Coastal Protection, Agriculture, Nature Conservation,” “Port industry” and “Settlement Development.” For two days, the event

will bring together science and practice in order to support the various coastal regions of Germany in developing and implementing regional and municipal adaptation strategies relating to the German adaptation strategy.

**Further information:**  
[www.klimzug-radost.de/termine/regionalkonferenz-hamburg](http://www.klimzug-radost.de/termine/regionalkonferenz-hamburg)  
[www.klima.hamburg.de/regionalkonferenz-2011](http://www.klima.hamburg.de/regionalkonferenz-2011)

## RADOST at the UN Climate Conference in Cancún



The „Foro Verde“ at the UN Climate Conference in Cancún

Similarly to climate summits in previous years, the 16th Conference of the Parties to the United Nations Framework Convention on Climate Change, which took place in November/December 2010 in Cancún, Mexico, was attended by a great number of civil society observers. This extensive representation made the negotiations develop into a global meeting place for the exchange of ideas on all issues concerning climate change. RADOST was involved in the discussions through its coordinator, Ecologic Institute, as well as the Helmholtz-Zentrum Geesthacht. Together with the Institute for Housing and Urban Development Studies (IHS) and the United Nations Human Settlements Programme (UN-Habitat), they brought stakeholders from Europe, North America, Asia and Africa together for a workshop. In addition to conference participants, the Mexican public also had access to the event, which took place at the “Foro Verde” (“Green Forum”) of the climate village. The themes of the workshop included experiences with adaptation communication, prerequisites for

the use of regional climate data, as well as mechanisms to avoid so-called “maladaptation” (i.e. misunderstood adaptation) and resource waste. The event finished with a discussion of practical examples from various coastal zones of the world and experiences with the dissemination of such examples on the regional and international level.

In addition, RADOST participated in a panel debate on „Implementation and Financing Strategies for Mitigation and Adaptation to Climate Change Impacts on Coastal Communities and Small Island Developing States” at Global Oceans Day, an event coordinated by the Global Oceans Forum in cooperation with three Mexican states. RADOST was also referenced in several other discussions, including a meeting of the Nairobi Work Programme on impacts, vulnerability and adaptation to climate change.

**For further information:**  
[www.klimzug-radost.de/termine/side-event-cancun](http://www.klimzug-radost.de/termine/side-event-cancun)

## Using Synergies – the New Project BALTADAPT

The kick-off meeting for the new project BALTADAPT („Baltic Sea Region Climate Change Adaptation Strategy”) was held from 10-12 January, 2011 in the Danish city of Roskilde. The goal of the project is to develop an adaptation strategy to climate change for the entire Baltic Sea region. The project is intended not only for the coasts but for the sea area itself, going beyond national borders. An action plan is being prepared to provide for a quick implementation.

In several regions of the Baltic Sea, good experiences with adaptation strategies have already been made, and many networks are being created. These, however, are often only fragmentary and do not take the Baltic Sea region as a specific ecoregion, with all of its distinctive features, into consideration. The European Commission therefore called for the creation of a climate change adaptation strategy for the entire Baltic Sea region. Through it, cooperation and exchange of ideas will be strengthened, and a single set of adaptation measures for all levels, from the transnational to the local, will be developed. This cross-boundary approach will help to eliminate one of the biggest points of weakness in the operational programme of the EU Strategy for the Baltic Sea Region: the lack of transnational cooperation in regional planning and in the prevention and handling of natural disasters.

The partner consortium, under the direction of the Danish Meteorological Institute (DMI), brings relevant national policy institutions and researchers together. All of the partners bring with them significant experiences in other regional projects covering questions of climate change. RADOST is expected to give a particularly great impetus, since it covers a relatively large project region with a comprehensive network.

# Publications

Both projects, RADOST and BALTADAPT, will be able to benefit from and assist each other's networking through regular exchange of ideas, which will be achieved due to the fact that several project partners are represented in both BALTADAPT and RADOST. Within BALTADAPT, the establishment of the information platform "Baltic Window" should improve the knowledge exchange between researchers and policy decision-makers. RADOST, too, can benefit from this and, in turn, share its own experiences with others.

**More information:**  
[www.baltadapt.eu](http://www.baltadapt.eu)

## First RADOST Annual Report Now Online

The first RADOST annual report is now available for download on the RADOST website. The report, complemented by numerous charts and graphs, describes the activities of the project within the five RADOST modules "Network and dialogue," "Natural and engineering sciences," "Socio-economic analysis," "National and European political setting/national and international exchange" and "Communication and dissemination of results," covering the time period from July 2009 to April 2010. Progress made thus far in these areas is described in concrete terms.

**Link:**  
[www.klimzug-radost.de/info/1-radost-jahresbericht](http://www.klimzug-radost.de/info/1-radost-jahresbericht)



## Book Publication on the Impacts of Global Change on the Baltic Region

Climate change and ongoing transformation processes in economy and agriculture will have strong and multiple impacts in the Baltic region. In particular coastal zones face increasing hazards, e.g. due to sea level rise or changes in riverine nutrient loads and eutrophication. These changes also offer a wide range of new opportunities in the Baltic Region. Adaptation measures are needed but require a thorough and spatially differentiated understanding of underlying ecological, economic and social processes.

The publication „Global Change and Baltic Coastal Zones,” which is supported by RADOST, provides comprehensive information on changes, consequences and practical challenges in the Baltic coastal regions. The book encompasses sixteen contributions prepared by authors from eight countries, including many scientists involved in the RADOST project. Beside risks, the chances and opportunities of changes for the region are addressed and adaptation examples and strategies are given.

„Global Change and Baltic Coastal Zones“ is aimed at a wide readership consisting of scientists and researchers from the fields of global change, geography, geology, social sciences, environmental sciences as well as environmental and coastal management, non-governmental organizations and policy makers.

The book is expected to be released in April 2011 and is published by Dr. Gerald Schernewski and Dr. Thomas Neumann of the Leibniz Institute for Baltic Sea Research Warnemünde as well as by Dr. Jacobus Hofstede of the Ministry for Agriculture, Environment and Rural Areas of the Land of Schleswig-Holstein.



## Events

Conference "EEclima- Estuaries in a Changing Climate"

**05 – 08 April 2011, Porto, Portugal**

[www.cimar.org/EEclima/index.htm](http://www.cimar.org/EEclima/index.htm)

Second Workshop on Water and Adaptation to Climate Change in transboundary basins: Challenges, progress and lessons learnt"

**2 – 13 April 2011, Geneva, Switzerland**

[www.klimzug.de/de/772.php](http://www.klimzug.de/de/772.php)

2<sup>nd</sup> International BaltCICA Conference – in cooperation with MARE

Coping with Climate Change

**11 – 12 May 2011, Bergen, Norway**

[www.baltcica.org/meetings/conference11.html](http://www.baltcica.org/meetings/conference11.html)

Konferenz "ICCAFFE2011 Climate Change, Agri-Food, Fisheries and Ecosystems"

**15 - 21 May 2011, Agadir, Morocco**

<http://nrccs.webnode.com/scientific-events/iccaff2011/english-version/>

RADOST-Annual Conference 2011

**18 - 19 May 2011, Travemünde, Germany**

[www.klimzug-radost.de/termine/RADOST-JK2011](http://www.klimzug-radost.de/termine/RADOST-JK2011)

Conference "Adapting to Climate Change Case Studies from the Baltic Sea Region"

**31 May 2011, Hamburg, Germany**

[www.baltex-research.eu/bsssc/index.html](http://www.baltex-research.eu/bsssc/index.html)

Symposium "Water related Measures for Adaptation to Landscape and Climate Change"

**22 – 24 June 2011, Großräschen/Lausitz, Germany**

[www.klimzug.de/de/732.php](http://www.klimzug.de/de/732.php)

2<sup>nd</sup> International Symposium on Integrated Coastal Zone Management

**03 - 07 July 2011, Arendal, Norway**

[www.imr.no/om\\_havforskningsinstituttet/arrangementer/konferanser/ICZM\\_2011/en](http://www.imr.no/om_havforskningsinstituttet/arrangementer/konferanser/ICZM_2011/en)

2011 LOICZ Open Science Conference

"Coastal Systems, Global Change and Sustainability"

**12 – 15 September 2011, Yantai, China**

[www.loicz-osc2011.org/index.asp](http://www.loicz-osc2011.org/index.asp)

Conference "Adapting to Coastal Change: local perspectives"

**13 – 14 September 2011, Den Haag, Netherlands**

<http://imcore.eu/TheHagueConference2011/>

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Traditio et Innovatio



vTI

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