



Working with the boards by Sonja Schmidt and Sophie Rotter

The active participation of stakeholders in the CLIWAT project plays an important role. For this reason so called *national boards* and a *transnational board* are established. According to the suggestions of a generic participatory process each partner country analyses stakeholders and invites them to discuss project results as well as to initiate adaptation processes. Furthermore, the transnational board aims at summarising experiences and exchange ideas gathered in all partner countries and supports the dissemination of research results.

To enable a smooth and productive process in the CLIWAT project it is necessary to implement a participatory struc-

ture and to enable stakeholders to take an active part in the project. For this reason, the envisaged national and transnational boards include representatives from relevant authorities and different sectors affected by climate change, to ensure a close collaboration between stakeholders and potential end-users with the project partner and to ensure tangible results in each case-study-country. The overall co-operative relationship between the project team and the national boards is positioned within the context of fostering an international exchange of experiences. The aims of the boards are:

- to give input and focus the investigations in the CLIWAT project in order to deliver the most urgent and needed results of the project to society; **(Cont'd on p.2)**

Editorial

The United Nations climate change conference in December 2009 is approaching. World wide, scientists, industry, NGOs, politicians and the public are preparing for the conference. The climate change subject has never been more urgent/ acute than in this specific moment. Scientists in general agree that the global warming is progressing. As a result, we in the North Sea region are facing higher global temperatures, sea level rise and a change in the precipitation pattern. In order to prepare society for these inevitable changes and determine useful and necessary protection measures, it is essential to base the adaptation process on a solid knowledge base derived from scientific research.

CLIWAT (CLImate change and ground-WATer) is a transnational project in the North Sea region dealing, on the one hand, with the mapping of ground water and, on the other hand, with sustainable planning and solutions for the coming challenges caused by climate change. The research and analysis planed are covering a broad spectrum of Geo science and will focus on gaining a better understanding of the effects of climate change on ground water quantity and quality.

A wide range of sectors e.g. waterworks, the construction business and agriculture

will be affected by the changes in the future. The knowledge generated during the project will add to the aim of involving all sectors affected by the changes. During the project the invited sectors are able to shape the research process through dialogue with the investigating scientific parties. The lessons learned will then be incorporated into new standards or, if needed, new legislation e.g. in the area of drainage construction, the building sector and for road constructions.

The CLIWAT project, which started in September 2008, is currently in its initial phase. The field work is being planed and carried out and the CLIWAT boards are being established. The CLIWAT newsletter will be published twice each year including relevant topics, which derive from and are discussed within the project. This first newsletter will inform you about the CLIWAT project in general, the progress already made, upcoming events and the planned research processes in the pilot areas. We hope you will find the newsletter interesting and invite you to leave comments and ask questions on our web site www.cliwat.org, where you are also able to subscribe to the newsletter.

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About CLIWAT: Adaptive and sustainable water management and protection of society and nature in an extreme climate

The project will focus on the effects of climate change on groundwater systems. CLIWAT aims to identify the challenges caused by the higher water levels, and to develop climate scenarios focusing on surface water and water supply as well as the impacts on buildings. The quality changes of the groundwater resource caused by salinization, outwash from point sources and new demands for irrigation are some of the issues which will be investigated. This will enable the North Sea Region to react more efficiently to the consequences of climate change. The project will build on and improve existing geophysical and geochemical methods; these will be tested in the partner regions in order to be able to develop ground water models and furthermore recommendations for the North Sea Region on how to deal with the consequences of increased groundwater levels.



CLIWAT staff (Photo: Tom Birch Hansen)

- (Continued from p.1) to be a contact-point where results of the project are delivered and the process towards an adaptation to climate change is initiated and continued;
- to seek national input on results and act as ambassadors for a transnational implementation of policies by participating in transnational meetings between representatives of national boards.

Role and participants of the boards

There will be four national boards during this project, one in each participating country. Complementing the above mentioned functions, the national boards are established:

- to assure a national input on the direction and content of the project from the beginning and to enable a larger number of persons and organisations to participate in the work and share the results;
- to elicit stakeholder needs (to identify and assess user needs);
- to act as a professional group of interested parties and authorities as well as national contact points where important findings of the project are delivered;
- to give input to and elaborate key policies as well as to make decisions more comprehensible and, moreover, to secure adaptation processes to potential impacts of climate change are illuminated;
- to transfer knowledge from the project to the affected sectors and give input to solutions in an adaptive process;
- to give feedback on the project results and products by setting priorities and to support their dissemination;
- to identify possible forms of dissemination for the developed products.

Each board will consist of approximately ten persons representing relevant authorities, municipalities and districts, who

will then participate in the project work and results. Depending on the question discussed in the partner countries and pilot areas the boards might be smaller.

The national boards will consist of project partners as well as end-users of the future project results, called “stakeholders”. The building and working process of the boards is supported by Seecon.

For each case-study country potential board-members and ‘hands-on’ representatives from local, regional and national levels exist. They have been contacted during the writing of the proposal and showed their interest by signed letters of interest whereas other stakeholders are being contacted during the project. Still, final decisions in regard to the composition of the boards will be taken during the course of the project in close collaboration with all project partners concerned.

Moreover, during meetings of the national boards, experts from other countries may participate to ensure the transnational dimension and enhance the exchange of different experiences and knowledge gathered in the field. National boards will function as advisory groups to the project partner and will guarantee an effective dissemination and use of (interim) project results. Finally, the last national board meeting will include a training component to be used in each partner country based on the elaborated project results in the working packages of the project. The working processes as well as the members of the national boards will be adapted to suit each partner country’s needs and requirements.

Transnational Boards

To strengthen transnational work in the project, transnational board meetings are organised to allow international exchange of knowledge and experience and to elaborate common needs for policies and decision points in the North Sea based on the national recommendations and actions. It is the task of the participating representative of each case study country to link the national recommendations and actions to the higher transnational level and vice versa during the two

transnational meetings. The meetings will be connected to activities of general interest like the United Nations Climate summit meeting in Copenhagen (30/11 – 11/12/2009) or specific fieldwork activities and excursions.

In addition to project partners, approximately three stakeholder representatives of each case study country will participate in the transnational meeting. Transnational meetings will be further used to invite experts from science to complement the interdisciplinary team. It is also acknowledged that the thematic input will be provided by the pilot areas and then further discussed in national and transnational meetings. Moreover, it was specified that so called 'hot topics', which are seen as relevant to all pilot areas (e.g. saltwater intrusion, polluted sites, ecological questions and water supply), could be used to organise discussions of interest for all partners during the meetings.

Organisation: Board Building

Although the structure of the single board meetings will be determined by the individual boards, a generic participatory process description was developed within the first project months to be used as a guideline for organising national meetings. It defines objectives and participants for each meeting and suggests a schedule and provides additional material. It could be used as a basis for discussion and stakeholder integration. The first meetings is described in detail to enable a sound start of the working process of the boards whereas the following meetings are explained in a more general manner to allow adaptation according to partner countries' and project partners' needs. First, an introductory two day national board meeting would be advisable. To facilitate the organisation, the meetings should be divided into half day steps, which could be reduced to shorter time steps if needed. In the following a description of single board meetings is given. Furthermore, a provisional schedule is suggested including working material for the meetings.

It is recommended to elect the transnational participant during the first day of the meeting to identify a responsible person to 1) join the transnational board meetings and report on the national board discussions and 2) to inform about transnational board discussions and feedback vice versa. Thus there is someone responsible to take care that results are transferred to and between the boards. The first national board meeting should focus on the identification of stakeholders and stakeholder needs. For this meeting, already suggested stakeholders are invited but a discussion during the meeting could help to identify additional stakeholders, who need to be included. Secondly, the meeting could be used to show how possible project results could address stakeholder needs. As the project results are still vague it is important to get an idea which stakeholder could be interested in which project result.

Objectives and chronology of national and transnational board meetings:

Board Building (National Board Meeting)

- to elect transnational participant
- to elicit stakeholders' needs
- to identify additional stakeholders
- to present possible project results and match it with stakeholder needs
- to adapt generic plan to national board needs

Stakeholder Integration (National Board Meeting)

- to elicit stakeholders' needs
- to link project results with stakeholder
- to identify forms of dissemination

Transnational meeting: Exchange & Coordination of Boards

- to exchange about national board meetings results
- to identify common issues of all national boards
- to give feedback to national board meetings about project results and dissemination

Shaping Project Results (National Board Meeting)

- to present project results
- to suggest types of dissemination of project results to stakeholder
- to identify national policies and decision points towards an adaptation to future climate changes

Transnational meeting: Lessons learnt & Outlook

- to exchange about national board meetings results
- to prepare the final conference
- to discuss the continuation of implementing project results

Presenting Products & Conclusions (National Board Meeting)

- to present project results for stakeholder/stakeholder groups
- to present training package

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Mapping the salt-freshwater interface under the island of Terschelling using airborne electromagnetic methods by Esben Auken

In December 2008 scientists meet in the Netherlands to plan two airborne geophysical surveys. Airborne electromagnetic methods enable three-dimensional high-resolution imaging of the subsurface. The surveys will be conducted on the island of Terschelling and on the mainland around Leeuwarden. On Terschelling we want to not only map the salt-freshwater boundary but also investigate if there are freshwater resources under the North Sea. On the mainland the purpose is to map salt-freshwater bodies along with a more general geological mapping.



Planning the operation (Photo: Esben Auken)

Geophysicists from Aarhus University and the German Geological Survey (BGR) meet with hydrologists and geologists from the Dutch geological surveys (DELTA RES) and Dutch water authorities to plan the surveys which involve quite extensive preparations, not only for the field crews, but ques-

tions also have to be answered about where to land the helicopter, where to get the jet fuel, and how to get all necessary permissions, and in addition, there is the actual planning of the survey areas and the flight lines. All this has to be settled before the actual operation can take place.

It was decided that only the SkyTEM system from Aarhus University will be used on the island of Terschelling as this system has a large penetration depth. Furthermore, it can also penetrate several meters of saltwater to look for the freshwater. The BGR system will be used on the mainland where the need for deep penetration is less, but a high resolution of the near surface is desirable. The SkyTEM system will also be used on the mainland to try to go really deep, and some of the flight lines will, for research purposes, be flown with both systems.

The exciting three-dimensional results from the two surveys are expected to be ready in early spring. SkyTEM flights will take place in late August 2009, and BGR will follow shortly after. The reason for waiting until late summer is not lack of equipment but, actually, the large bird population on Terschelling in spring and during the summer period. The birds would probably be rather uncomfortable having to compete for the air with a large and very noisy helicopter.

As soon as pictures and results from the airborne surveys are available, they will be published on the CLIWAT web page.

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First German CLIWAT board meeting on the island of Borkum by Paul Königer

Researcher of the German CLIWAT group from Hannover visited the Island of Borkum to plan upcoming field activities.

During the last week of January researchers from Leibniz Institute of Applied Geophysics (LIAG, Hannover, Germany) visited the East Frisian Island Borkum for three days. The objective of the visit was to contact stakeholders and to organise the upcoming field measurement campaign of the CLIWAT project on the island. On Borkum freshwater resources are limited and might be affected by climate change. The field campaign will help to determine the effects of climate change on the groundwater system and induced future impacts on water resources and ecology at the island of Borkum. On Wednesday morning a meeting with Axel Held - the director of the municipality of Borkum - and Sebastian Winter - con-

sultant of a hydro-geology consulting office - was held at the office at "Stadtwerke Borkum".



German CLIWAT board group on Borkum (Photo: Franz Binot)

The "Stadtwerke Borkum" is responsible for the water and energy supply of inhabitants and visitors of the island. The group got a very informative introduction to local water supply infrastructure and had the possibility for a discussion on knowledge and needs of the local water supply management of the island. The discussion was followed by an afternoon excursion to the Waterdelle and Ostland catchments to see several water supply and observation wells. Specific locations were inspected for possibilities to conduct pumping tests which are necessary to determine hydraulic conductivities, an installation of thermo sensor equipment and for groundwater

recharge investigations as input for the hydro-geological modelling. The group highly appreciated the opportunity for an early field visit and the friendly and supportive welcome from local stakeholders as well as the scenic location although the weather and temperature conditions were not at its optimum during this early time of the year.

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CLIWAT workshop about the organisation of fieldwork in Hannover

by Helga Wiederhold & Reinhard Kirsch

A workshop about the organisation of the fieldwork to initiate work package 4 of the CLIWAT project was held at the Leibniz Institute for Applied Geophysics (LIAG) in Hannover, February 16 - 17 2009. About 27 colleagues from the project partners and some guests took part. The fieldwork gives essential input data for the geological and hydrological models of the seven pilot areas which are examined in detail in the project. Methods like engineering seismology, Geo-electrical or electromagnetic surveys from surface or airborne, gravity, drillings and well logging and pump tests give crucial information on the delineation of the aquifers or less permeable confining layers and hydraulic important parameters.

The focus of the first day was on geophysical and modelling techniques relevant for the project areas. Norbert Blindow (University of Münster, Germany) gave a presentation on his newly developed pulled array radar technique which allows obtaining multi-fold data leading to higher penetration and determination of water content of the near surface layers. Arjen Kok (Vitens, The Netherlands) showed results of a continuous vertical electrical soundings and direct push measurements for the determination of the salinity distribution on the Island of Terschelling. Reinhard Kirsch (Technical University of Berlin, Germany) discussed geophysical approaches for the determination of hydraulic conductivities. Hans Sulzbacher (LIAG, Germany) and Jan Gunnink (Deltares, The Netherlands) gave input to the discussion which information is required for modelling. Also the choice of climate scenarios was addressed. A challenge in the interpretation of geophysical data will be the differentiation between saltwater and clay layers. Klaus Hinsby (GEUS, Denmark) pointed to the groundwater chemical status and the algae bloom problem. Additionally, first results from the pilot areas *Egebjerg* and *Aarhus River* were presented. The day finished in relaxed atmosphere forming working groups and starting discussion about the field work while having snacks and drinking beer. On the second day the possibilities to use the CLIWAT web page and to exchange data and information were demonstrated. Then working in the groups continued to organise the fieldwork in the pilot areas in detail. As result the participants agreed that for each pilot area a field campaign calendar is required to keep the project partners and stakeholders informed about the activities in the area. This calendar will be accessible at <http://cliwat.eu> from 1st of April 2009.



Knowledge exchange, discussion and development of concepts during CLIWAT workshop in Hannover (Photo: Reinhard Kirsch)

The workshop started with new information from Rolf Johnson of the Lead Beneficiary about the regulations on controlling and on further INTERREG North Sea projects with subjects related to CLIWAT (e.g. Aquarius, CPA or Dipol). The possibility of a cooperation with these projects will be evaluated.

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Starting the participatory process in CLIWAT - report from the first Danish national board meeting, March 2009

by Holger L. Strøm, Jes Pedersen & Rolf Johnsen

In total 26 persons attended the meeting representing sectors across the country and the 7 Danish partners. The success of the CLIWAT project is dependent on an active involvement of influenced sectors represented in the boards. The involvement will help to implement adaptation to climate change on groundwater in the future. The board's primary function is to deal with the results presented by the CLIWAT project and reflect how these results will influence each sector. In this process the board will specify the results needed to help the adaptation process in each sector. This could include that they would like to see a map of flooded areas in the future in order to deal with the results locally. It may also be a map showing changes in groundwater level in the future. A strong participation of the board ensures that the results are used in the affected sectors.



Attendees at the first Danish national board meeting
(Photo: Rolf Johnsen)

The attendees represented the building and construction sector (within both building sector and infrastructure), local, regional and national authorities, research institutions, agriculture, waterworks and NGOs. At the meeting the board mem-

bers were actively involved in responding to how the climate changes and ground water will affect each sector. It quickly became clear that the board sees a great need for better studies of groundwater conditions. Some sectors demand quantitative analysis, like future groundwater levels, while others ask for a better understanding of the impact on water quality. Central themes were among others:

- Do we need new mapping procedures to incorporate future climate scenarios?
- Procedures for adaptive management and planning in a new climate regime;
- Description on how changing groundwater levels will affect foundations of buildings and infrastructure;
- Forecast on where new wetlands will be formed.

The Danish board will meet regularly during the project period. Next meeting will be the 17th of September 2009 in Vejle. All presentations from the meeting can be found at: www.cliwat.org.

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CLIWAT dissemination

by Klaus Hinsby

The CLIWAT project was presented at international meetings and conferences in Aarhus, Vejle (Vingsted) and Copenhagen during the first two weeks of March. Rolf Johnsen (Region Midtjylland) gave an oral presentation "Adaptive and sustainable water management and protection of society and nature in an extreme climate – presentation of CLIWAT a collaboration project in the North Sea Region" at the Aarhus conference, while Klaus Hinsby and others (GEUS) had an abstract and a poster "Climate Change: Impacts, Adaptation and Integrated Groundwater Management in the North Sea and Baltic Sea Regions" at the conference in Copenhagen. The conference in Aarhus "Beyond Kyoto – Addressing the Challenges of Climate Change", March 5-7, was organised by the University of Aarhus, and had more than 1000 participants. The "International Scientific Congress on Climate Change in Copenhagen", March 10-12, was hosted

by the University of Copenhagen, and organised in cooperation with the *International Alliance of Research Universities* (IARU). This congress had more than 2000 participants. Both of the scientific conferences were organised in the run-up to the *United Nations Climate Change Conference* (COP-15) in Copenhagen in December 2009. The key messages of the two conferences were handed over to the Prime Minister of Denmark and COP-15 chairman on March 12, 2009. You can find the key messages of the two conferences on the CLIWAT website <http://cliwat.eu>. Between these two large conferences the CLIWAT participants Klaus Hinsby, Karen G. Villholth and Richard Thomsen (all GEUS) organised an international theme day "Climate Change and Adaptive Water Management in EU and Beyond" at the Annual Winter Meeting of the Soil and Groundwater Group of the *Danish Academy of Technical Sciences* (ATV).



Professor Stefan Rahmstorf (Potsdam Institute for Climate Impact Research - <http://www.pik-potsdam.de/stefan/> - member of IPCC working group 1) presenting latest data on sea level rise at the Copenhagen Climate Congress, March 10-12, 2009. New data show that the sea level most probably will rise faster and higher than estimated in the latest IPCC report (Photo: Lizette Kabré)

At this meeting, which also announced a re-launch of a Danish National chapter of the IAH (International Association of Hydrogeologists - <http://www.iah.org>), more than 50 participants presented and discussed the challenges of climate change and adaptive water management.

More information about the conferences, the abstracts of the presentations mentioned above and the powerpoint presentations of Rolf Johnsen and the IAH/ATV theme day are available on the [CLIWAT website](#).

Further reading:

Aarhus Conference Beyond Kyoto: <http://www.klima.au.dk/dk/forside/konferencebeyondkyotoconferen/>
 Copenhagen Climate Congress: <http://climatecongress.ku.dk/>

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Schedule of events

Events				
Date	Event	Content	Location	Link
08/12-17/12/2009	COP15	UN Climate Change Conference	Copenhagen	http://en.cop15.dk
09/2009 (planned)	CLIWAT Second National Board Meetings	Presentation of preliminary results, Checking the direction of the project and feedback from the boards and - if invited - of experts from science to the decisions made in the first meeting	n.t.	http://cliwat.eu
20/04-22/04/2009	CLIWAT project partner meeting		Terschelling	http://cliwat.eu

The above dates and locations may change. The editors are neither responsible nor liable for any inconvenience resulting from such changes.

Imprint

CLIWATInterReg Newsletter is published on a semestral base in PDF format.

Press date for the March issue: 31st of March 2009

Publisher: **Seecon** Deutschland GmbH

Contact: info@seecon.org

Editors: Sophie Rotter and Jörg Krywkow, **Seecon**

This newsletter is an output of the EU InterReg project CLIWAT, (Interreg IVB journal no.: 35-2-1-08). The project is partly financed by the European Regional Development Fund under the European Union.

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