DiPol

WP “Implementation”

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DTU Environment

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Contents

1. Introduction

The overall aim of DiPol is to collect knowledge on the impact of climate changes (CC) on water quality, to communicate and raise awareness towards this knowledge, to improve the ability of decision makers to counteract these impacts on local and international level, and to facilitate public participation herein. To illustrate the impacts of CC on water quality and evaluate the consequences of potential measures, a tool called SIMACLIM was be developed during the project. The goal of the implementation work package “WP 5” was to actively involve the Stakeholders and decision makers to follow and guide the SIMACLIM development by applying the tool and using the platform on different national and international workshops, hence testing its suitability for their purposes and taking a role in its elaboration.

This report describes the various workshops and activities conducted to actively involve the stakeholders and decision makers in development and implementation of SIMACLIM and the experiences and conclusions from these workshops and activities. The report is divided into following sections:

- Development of SIMACLIM (Chapter 2)
- Testing and Implementation of SIMACLIM at the 4 Case studies
    - Hamburg Case Study (Chapter 3)
    - Gothenburg Case Study (Chapter 4)
    - Oslo Case Study (Chapter 5)
    - Copenhagen Case Study (Chapter 6)

2. Development of SIMACLIM

SIMACLIM consists of 2 tools: Sensitivity Analysis Model and Relative Regional Risk Ranking Model (4R Model).

The details about these 2 tools are described in the WP4 report, whereas the involvement of stakeholders and decision makers in development and testing of these tools are described here.

The involvement of stakeholders is mainly achieved via participation in workshops. The Workshops were conducted at 2 levels: Project level and case study level.

The project level workshops were conducted in connection with the DiPol consortium meetings. The participants of these workshops mainly comprised of DiPol partners, subpartners and the following associated members.

- Landesamt für Natur und Umwelt SH Geologischer Dienst (Dr. Reinhard Kirsch)
- Landesbetrieb Straßen, Brücken, Gewässer Geschäftsbereich Gewässer und Hochwasserschutz (Frau Käthe Fromm)
- INSTITUTO SUPERIORE di SANITA (Mario Carere)
- Common Wadden Sea Secretariat (Dr. Harald Marencic)
- Bundesanstalt für Gewässerkunde (Frau Dr. Schubert)
- SGU – Geological Survey of Sweden (sgu@sgu.se)
- Institut für Hygiene und Umwelt Abt. Wasseruntersuchungen (Frau Dr. S. Sievers)
- Ministerium für Landwirtschaft, Umwelt und ländliche Räume SH (Dr. Bernd Scherer)
- Landesamt für Natur und Umwelt SH Dez. Küstengewässer (Dr. J. Voß)
- Ministerium für Soziales, Gesundheit, Familie, Jugend und Senioren SH (Dr. Dr. Ansgar Knobling)
- Water Quality Association of the Bohus Coast (Pege Schelander)
- Kreis Herzogtum Lauenburg Fachdienst Wasserwirtschaft (Herr H. Kock)
- Hansestadt Lübeck Bereich Umweltschutz (Hr. Manfred Hellberg)
- The Göteborg Region Association of Local Authoristies (Nils-Gunnar Ernstsson)
- Senat der Freien und Hansestadt Hamburg Senatskanzlei (Prof. Dr. Heinrich Reincke)
- WWF Deutschland Internationales WWF-Zentrum für Meeresschutz (Hr. Alfred Schumm)
- NABU Hamburg e.V. Haus der Zukunft (Hr. Tobias Ernst)
- GÖP – Gesellschaft für ökologische Planung e.V.
- Elbe-Tideauenzentrum Bunthaus Moorwerder Hauptdeich 33
- Port of Göteborg
- HPA – Hamburg Port Authority (Hr. A. Netzband)
- IBA Hamburg GmbH (Hr. Uli Hellweg)
- Wassergütestelle Elbe der Arbeitsgemeinschaft f.d. Reinhaltung d. Elbe (Hr. Thomas Gaumert)

- Göteborgsregionens kommunalförbund (GR), Göta älvs vattenvårdsförbund * Vattenråd för Göta älv, Mölndalsån & Säveån (Monica Dahlberg)
- Sveriges geologiska undersökning (SGU) (Ingemar Cato)

The frequency and participation of the local level workshops are described in the respective case study sections.

3. Hamburg Case Study

The impact of climate change was tested using the SIMACLIM tool on a small river on the area of the city Lübeck. The question for the Sensitivity Analysis was:

"How is it possible to reach and secure sustainable the high status according to the Water Framework Directive".

Students from FH Lübeck investigated the river hydrologically, chemically and biologically to get data for the Sensitivity Analysis. The Sensitivity analysis was carried out at a four day workshop with Master students from FH Lübeck. The results were presented to members of Lübeck City authority.

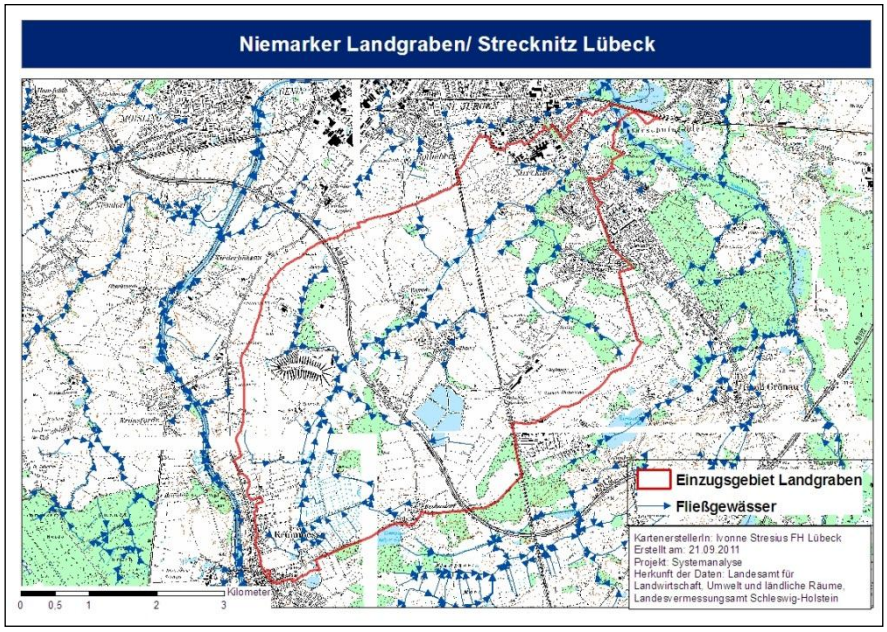

Figure 1: Catchment Area for the Sensitivity Analysis

Emissions and the agricultural land use are identified as the 2 most critical variables in the catchment area of the Strecknitz. The analysis of the systemic roles of the variables showed that the variables, where measure can be applied to improve the water quality, would be an improved implementation of environmental laws and a stronger impact of environmental political activities.

The effect structure and the analysis of the feedback loops showed that the system is rather sensible and unstable, which means that interventions had to be made very carefully. A positive result was that there are no highly but only slightly critical variables.

These results of the Sensitivity Analysis were presented to several members of the administration of the City of Lübeck in a workshop. The participants were part of the local water authority, the nature conservation authority and the department of environment protection. Together with these participants the Relative Regional Risk Ranking Model was carried out. First the results of

the Sensitivity Analysis were discussed and supplemented. Then the connection between the Sensitivity Model and 4RM was discussed and the input for the 4RM was worked out.

It turned out that doing the Sensitivity Analysis (SMW) for the System is a perfect preparation for the 4RM. The SMW is an effective tool for communication among experts of different subject areas. It brings all kind of information (hard and soft data) together and structures and organizes it. The result is a common understanding of the topic and the essential parts of the system.

Moor and forest showed the lowest risk, acres, extensive grassland and waters showed the highest risk for the indicators ecological and chemical quality.

The highest risk for the indicators comes from pesticides, PAH and nutrients from drainages.

The highest risk for the indicators is produced by agricultural land use.

The participants were all very satisfied with the working process with SIMACLIM itself and with the results. The common opinion was that SIMACLIM was a perfect and feasible tool for dealing with complex problems.

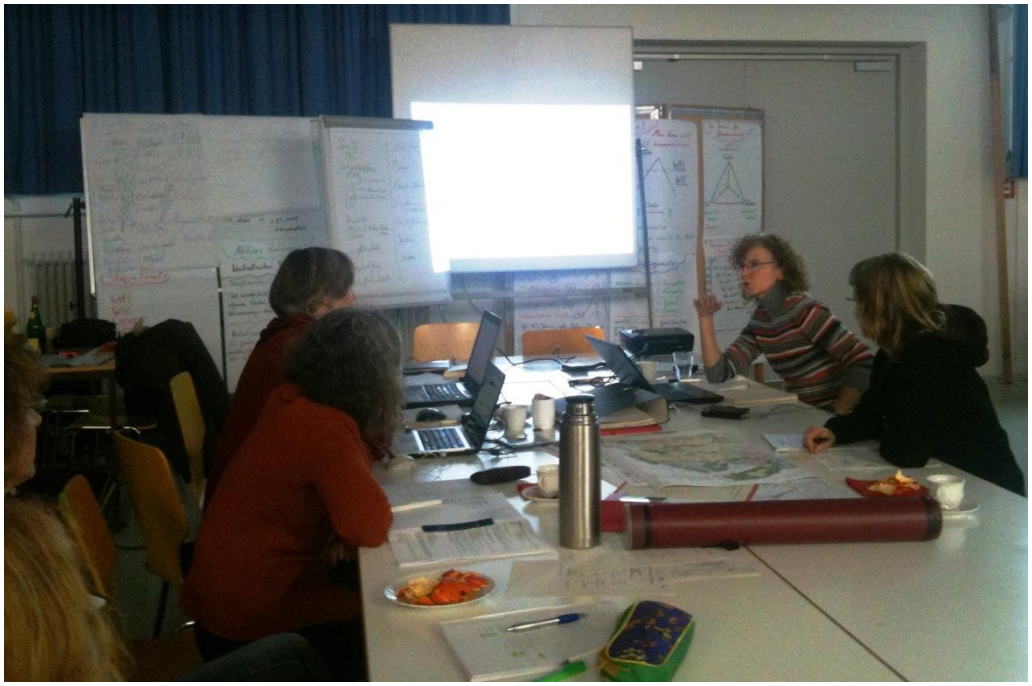

Figure 2: Participants of the 4RM Workshop

The development and the results of SIMACLIM were presented to several stakeholders in Schleswig-Holstein. The Federal Institute of Hydrology was interested in the development of SIMACLIM, the work with the tool and the results were presented to the FIH. The model was also presented and discussed at the 5th DiPol Consortium meeting in Delft.

SIMACLIM will be used in the new EU-FP7 Project ARCH and will be a constant part of the work of the research at FH Lübeck.

Participating Stakeholders:

- Administration of the City of Lübeck
    - the local water authority,
    - the nature conservation authority
    - the department of environment protection
- Ministry of Work, Social Affairs and Health
- Landesamt für Landwirtschaft, Umwelt und ländliche Räume
- Meeting of Water Hygienic, members of water and health authorities of all districts in Schleswig-Holstein.

4. Gothenburg Case Study

Sensitivity modeling was done in cooperation with the Göta älv River Water Council, which is the main stakeholder group within the county administration office. Two workshops involving the members of the "Göta älv vattenråd" and dealing with the Sensitivity Model were held at the offices the Göteborg Region Association of Local Authorities (GR) on 2011-04-19 and the Swedish Geotechnical Institute (SGI) on 2011-04-25. After each workshop, the DIPOL partners in Gothenburg had separate workshops focused on compiling and interpreting the results.

The Sensitivity Model identified the system as relatively stable. Many of the variables acted as "buffers", and were not greatly changed in response to changes in the variables. This may allow for planners to recognize consistent, predictable conditions, but it also limits the choices they have for inducing changes when these are needed, for instance to improve water quality in certain areas. The system is also interpreted to respond comparatively slow to changes, so that decision makers must realize that both positive and negative effects will often be evident only with considerable time. Modelling becomes important in this connection because it can stress the long-term importance of alternative actions.

"Environmental improvement measures" are considered to be the most effective "lever", and these could include protection against flooding, remediation of contaminated soils and landslide prevention. "Flow regulation" of the river and "legislated" control were also relatively important variables that had an impact on the system but that were, themselves, less reactive according to the analysis of the workshop group. On the other hand, the "state of the estuary" is the most impacted variable while at the same time having a moderate influence on the other system variables. In this way, it has the most "critical" role in this modeled system, meaning that it is most involved in the feedback cycles and can shift the system's balance. The model was presented and discussed at the 5th DiPol Consortium meeting in Delft.

The Relative Regional Risk Ranking modeling (4RM) was done within the project group, using the experience from the Sensitivity Modeling and from the Gothenburg activities within the Risk Analysis Work Package of DIPOL. The 4RM results suggests that, although the Göta älv River water quality is strongly influenced by influences from upstream sources, the urban sources in Gothenburg have a significant impact. This is even more obvious if the main tributary streams are considered as sub-areas and habitat environment, since their flow conditions vary from ca. 0.4 m^3/sec to 20 m^3/sec, whereas the Göta älv River has about 180 m^3/sec. The industrial sources and stormwater runoff were the two main urban sources for environmental stressors.

Figure 3: Participants at the Sensitivity Workshop

Figure 4: Participants at the Sensitivity Workshop

Considering that “environmental improvement measures” are considered to have an active impact on the surface water quality system, as we concluded the Sensitivity modeling, one area needing attention is stormwater management. The importance of good stormwater management is further emphasized by one of the feedback cycles in our Sensitivity modeling where population density leads to more urban hard surfaces increases and greater stormwater runoff, which would negatively impact on water quality. Additionally, the combined sewer and stormwater system in some parts of Gothenburg results in frequent overflows from the sewage treatment plant. Therefore, management alternatives need to be considered at: 1) the pollutant sources (industries and traffic), 2) along the transport pathways (hard surfaces and stormwater drainage network) and 3) at the recipients (sewage treatment plant and urban waterways). Quantitative contaminant modeling with a source-to-sink perspective was initiated within the Risk Analysis Work Package, and connects well to these conclusions regarding proactive water-quality management.

The Göta älv River Water Council was partly interested in the SIMACLIM modeling as a means for increasing the communication and understanding between the various stakeholders on the council, where wide-ranging interests and reference backgrounds have often lead to polarized discussions and less effective work regarding their management responsibilities. Our SIMACLIM modeling facilitated a broad perspective by introduction the river system and the numerous variables (27 variables were included in the modeling) that interact with each other and impact on the water quality.

In addition we have had individual contacts with several other stakeholder groups in connection with our SIMACLIM modeling activities.

Apart from the above mentioned workshops a more general pollution modeling seminar was held at Univ. Gothenburg on 2010-09-14, where the last 5 stakeholders in the list above were represented.

Participating Stakeholders:

- Göta älvs vattenvårdsförbund (Göta älv River water council; Monica Dahlberg)
- Göta älvs vattenråd (representing the regional river stakeholders listed below)

  (Gbg stad, kretsloppskontoret, Naturskyddsföreningen, Stena Line, Göteborg Vatten, GRYYAB, Göteborg Vatten, Trollhättan Energi AB, Miljökontoret Trollhättan stad, Miljöförvaltningen, Lilla Edet kommun, Sportfiskarna, Vattenmyndigheten/Länsstyrelsen, Södra skogsägarna, Kungälvs kommun, Göteborgs Hamn AB, Göta älvs vattenvårdsförbund /GR)
- Göteborgsregionen (Göteborg Region Association of Local Authorities; Monica Dahlberg)
- Länsstyrelsen Västra Götaland (County Administration; Mikael Cremle, Ingela Isaksson)
- Göteborg Stad (Gothenbury City; Ulf Moback, Cecilia Dalmah Eek – chairman Göta älvs vattenråd)

- Vattenmyndigheten Västerhavet (Water District Västerhavet; Hans Oscarsson)
- Naturskyddsföreningen (nature conservation society; Bo Svärd)
- Kretsloppskontoret (Gothenburg recycling office; Lena Blom, Agneta Sander)
- Lantbrukarnas riksförbund (National agriculural council; Åke Nicklasson)
- Eka Chemicals AB (Göran Andersson)
- GRYYAB (water treatment plant, Charlotte M. Bourghard)
- Swedish Geological Survey (Ingemar Cato)
- Göteborgs Vatten (David Johnson)
- Consultant Barbara Thulin
- Sanitation consultant with *"Doctors without Borders"* (Jenny Levander)

5. Oslo Case Study

A workshop was conducted to develop the sensitivity model for the Oslo case Study. 12 stakeholders were invited to the workshop, and 5 of them took part. The question for the Sensitivity analysis was “Influence of climate change on water quality: Example – Inner Oslofjord and rivers”. The participants of the workshop were relatively homogeneous group of people with engineering or natural science background and were occupied with environmental issues. They felt that a better scenario description was a serious short-coming. The other experience was that the System was rigid and didn’t allow to put in arguments for classification. Level of abstraction will make it difficult to get participation from policy makers and NGOs.

Figure 5: Catchment Area for the Sensitivity Analysis

Figure 6: Participants at the Sensitivity Analysis Workshop

The Relative Regional Risk Ranking (4RM) was developed within the project group. The results were presented to the Norwegian Climate and Pollution Directorate, that is a Norwegian stakeholder and partner in the DiPol project, and they commented on the outcome from the 4RM.

Participating Stakeholders:

- Oslo Harbour
- Norwegian Road administration, Regional office
- Oslo Water Board
- Norwegian Climate and Pollution Directorate
- Elvebakken skole

6. Copenhagen Case Study

Albertslund Municipality, Hvidovre, Copenhagen municipality and Glostrup Municipality are both partners and the main stakeholders from the Copenhagen Study Area. The sensitivity model for the copenhagen case study was developed by establishing a core team consisting of these 4 stakeholders, DTUEnvironment and external consultant DHI. The question for the sensitivity analysis was " How to improve the recreational quality of Harrestrup River and surrounding areas and the factors influencing this". 3 workshops were conducted to develop the model. During the first workshop the core team set up the first version of the sensitivity model. At the second workshop the model was presented to other stakeholders (participation from 5 other municipalities, 4 NGOs, and 1 environmental authority) and the various variables and their relationship were discussed. A third workshop was conducted with the core team alone, where the suggestions from the second workshop were incorporated in to the model. The model was presented and discussed at the 5th DiPol Consortium meeting in Delft.

Figure 7: Catchment Area

Figure 8: Participants at the Sensitivity Analysis Workshop

Figure 9: Participants at the Sensitivity Analysis Workshop

The 4RM model was developed only by the core team using the experience from the Sensitivity analysis. The experience shows that 4RM is a useful tool to identify the areas to be prioritized and communicate the message to the stakeholders.

Participating Stakeholders:

- Gladsaxe Municipality
- Rødovre Municipality
- Brøndby Municipality
- Herlev Municipality
- Ballerup Municipality
- Naturgruppen
- Lokalafdelingen for DN
- Naturstyrelsen