Proceedings of the Flood Risk Management Conference
North Sea Region

Berichte des Landesbetriebes Straßen, Brücken und Gewässer
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Hamburg 17–18 November 2011

SAWA

Hamburg

Proceedings of the Flood Risk Management Conference North Sea Region

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Präambel

For several years experts are speaking of the central role of cross-border cooperation and its benefits when it comes to floods respectively to their prevention. In this connection cross-border cooperation can be considered and interpreted at different scales. Limits are given to flowing waters on local, regional, supra-regional, national and international level. However experts with significant experience in the relevant field agree on that a close networking and collaboration as well as the exchange of knowledge and information will lead, totally independent from the scale, to a considerable added value on all levels and should therefore become the general aim.

The legal anchoring to this principle is given in the Flood Directive (EC 2007/60). Nevertheless, in spite of legal regulations quite a few obstacles need to be overcome, particularly across national borders, before different parties can smoothly work together.

The transnational cooperation starts here. The Flood Directive concerns all member states alike and is a real challenge in implementation. The best way to face up this challenge is a transnational strategy, as problems often can't be solved on national level only. Professional skills of the participating actors become expanded by growing experiences and improving communication skills. A significant role also plays the improvement of language skills and an enhanced inter-cultural competence. Common solutions for structural problems concerning all parties involved are searched for and developed on professional level.

Last but not least the participants involved become better informed upon exemplary solutions and alternatives by the intensive exchange of ideas and experiences. Beside this, innovative solutions are inspired and supported and new options to take action are developed.

SAWA has the objective to contribute to an improvement of transnational collaboration. This aim was being followed by the realization of very precise concepts for the implementation of the Flood Directive as presented in detail during this conference.

Jeff Marengwa

SAWA Projekt Leader
Agency of Roads, Bridges and Waters (LSBG)
Free and Hanseatic City of Hamburg
Hamburg, November 2011

Conference Program and Participants

Motivation

Being confronted with raising flood risk due to climate change, uncontrolled human activities and human interventions into the processes of nature water management experts and other professionals have to develop sustainable and well communicated strategies to cope with a growing impact of floods on human health and economic losses. Coordination and collaboration at the level of the European Community is expected to bring considerable added value and improve the overall level of flood protection. Consequently the European Community has passed a new legal instrument, the Directive on the Assessment and Management of Flood Risks (EC 2007/60). Strict and tightly calculated deadlines are given for the European wide implementation of flood risk management plans. A successful implementation of flood risk management plans asks for a harmonization of both directives, the Directive on the Assessment and Management of Flood Risks and the Water Framework Directive (EC 2000/60).

The participating European Partner Alliance has identified and worked on three key areas where water management can be improved under the premise of supporting a sustainable regional development:

» The full implementation of a river basin based management of water has to integrate flood risks and water quality aspects. A number of application samples will show how local decisions making can become an integral part of catchment based planning and how the concept of Flood Risk Management Plans can be implemented in different European countries.
» Catchment scale flood defense measures have to be efficient and sustainable. Practitioners are faced with the challenge of making measures more locally adaptive without losing effectiveness on a catchment scale. A quick and well-founded assessment of the efficiency of a measure or a set of measures will support decision making and might accelerate the planning process.
» Capacity building is a main pillar for implementing an adaptive management structure in any river basin. The demand will be to improve education and communication in order to integrate stakeholders on all levels. This key area includes building up institutional structures, developing human resources and conserving the acquired knowledge of Flood Risk Management.

Finding solutions to these challenging problems requires close collaboration between practitioners, scientists and stakeholders from public and federal organizations. Many projects are currently dealing with the same questions - real progress will only be made by sharing and communicating the experiences. This is what the conference intended to do and what defined the basis for inviting different target groups.

Our program leaded through different aspects of the flood risk management planning cycle and aimed for contributions to a vivid conversation.

Representatives from about 20 organisations presented their experiences on flood risk management planning processes and other sustainable water management actions gained during the last three years inside and outside of SAWA projects. Our speakers can look back on many years of experiences and expertise and are very well linked on European level.

PROGRAM
17th Nov. 2011: Conference

Opening
- » Welcome
  Holger Lange, Secretary of Urban Development and Environment, Free and Hanseatic City of Hamburg (GER)
- » EU-Funds for Sustainable Development in NSR
  Jesper Jönson (INTERREG North Sea Region, Joint Technical Secretariat Viborg) (DK)
- » The Project SAWA at a Glance: Approach and Results
  Jeff Marengwa (Agency of Roads, Bridges and Waters (LSBG), Hamburg) (GER)

EU Flood Directive and Water Framework Directive
- » From Directive to Implementation: Coordination on EU Level
  Barbro Näslund-Landenmark, Swedish Civil Contingencies Agency, Risk and Vulnerability Department (SWE)
- » From Directive to Reporting: The relevance of INSPIRE and WFD for the FRM-Planning
  Ramon Hiemcke, State Agency for Agriculture, Environment and Rural Areas, Schleswig-Holstein (GER)
- » Conflicts and Synergies of Flood Risk Management Directive and Water Framework Directive – structural analysis and empirical results
  Mariele Evers (Leuphana University Lüneburg) (GER)
- » Implementation Process: Structures and Strategies in the Project Countries
  Natasa Manojlovic (Hamburg University of Technology) (GER)

- » Questions

Experiences from Flood Risk Management Planning (Examples: FRM-Plans in SAWA regions)
- » Waters Systems Lake Vänern / River Klärälven (SWE)
  Susanna Hogdin (County Administrative Board of Västra Götaland)
- » River Gaula / River Tana (NOR)
  Oddrun Waagø / Eirin Annamo (Norwegian Water Resources and Energy Directorate)
- » River Illmenau (GER)
  Mariele Evers (Leuphana University Lüneburg) (GER)
- » Panel Discussion; From EU directives to practical implementation: does practice meet the theory?

Stakeholder Involvement
- » Example FRMP Wandse (GER)
  John Blanksby (University of Sheffield, UK) / Natasa Manojlovic (TUHH)
- » Stakeholder Involvement in the Netherlands (NL)
  Dolf Daal (Waterboard of Delfland)
- » Perspectives from a Local Authority's Point of View (SWE)
  Anna Sjödin (City of Karlstad)

- » Questions, Discussion

Capacity Building
- » Capacity Building from a Regional (Practical) Perspective
  Jan den Besten (Watershap Hunze en Aa's, NL)
- » Higher Education: the Master Course Integrated Flood Risk Management
  Lars Nyberg (Karlstad University, SWE)

- » Questions, Discussion

How to Make FRM Successful and Effective?
- » Panel Discussion: Lessons Learned, Messages and Future Perspective

Conclusions / Completion of Day 1

Informal Exchange / InfoCenter Kesselhaus / HafenCity

18th Nov. 2011: Workshops

Day 2 is partly organized as workshop. We are interested in your opinion and arguments and we therefore want to discuss with you in smaller groups. Please share with us your individual experiences and knowledge. The workshop characteristic should enable us to focus on specific topics, to bundle our expertise, to look even more into detail, to hold controversial discussions and to precise our recommendations.

Opening

» Welcome
Dagmar Goltermann (SAWA) / Peter Heiland (IU)
» Presentation on Climate Change
Phil Graham (Swedish Meteorological & Hydrological Institute, SMHI)

Parallel Workshop I:
FRM-Planning-Cycle Process – Tools – Actors

Input Statements

» FRM-Planning Strategy – experiences: The example of the Nahe FRM-Plan (Germany)
Heinrich Webler (ICON Water and Environment Consulting, Mainz, GER)
» Climate change in flood risk management plans
Reina Groen (Province of Flevoland, NL)
» Requirements for the Coordination of Flood Risk Management Planning
Peter Heiland (INFRASTRUKTUR & UMWELT Prof. Böhm und Partner, GER)

Chairs

» *Natasa Manojlovic (Hamburg University of Technology)*
Phil Graham (SMHI)

Main aspects of this session?

» Is it really possible or desirable to have one common strategy? Can we agree on a standardized set of available basic data?
» Which level of stakeholder involvement do we really need? Can we agree on a standardized set of parties to be involved in planning / decision making process (DSM)-process?
» Which tools might be used to facilitate (DSM)-process?
» List of recommendations that might be played back to EC

Parallel Workshop II:
FRM-Planning-Cycle Measures – Techniques – Efficiency

Input Statements

» Examples for Measures: Green Roofs and Rain Gardens
Bent Braskerud (NVE)
» Sustainable Flood Retention Basins and DSS
Miklas Scholz (University of Salford)
» SUDs and brook restoration in urban areas: results from exemplary Studies Wandse (Hamburg)
Tobias Ernst (HafenCity University Hamburg)

Chair

» *Arthur Scott (Hariot-Watt University, Edinburgh)*

Main aspects of this section

» Do we agree on these types of "synergetic measures" and their impact in flood retention in FRM-plans? Discussion of these examples.
» What has to be improved in the development of measures? (Is innovation needed?)
» How to decide on the most appropriate measure / set of measures? How to bring the best alternatives into decision making process?
» Do we need a standard catalogue of (types of) measures (national / international)?
Which kind of databank would be helpful? Target group?

Guided Poster Tour

Plenary / Cross cutting Workshop III:
Capacity Building – Dissemination – Education

Input Statements

» Capacity building in flood risk management – a user perspective
Leif Gustavsson (County Administrative Board of Värmland)
» Sustainability Education Centres – the Dutch example
Dolf Daal (Waterboard of Delfland)
» Floodville - a game for flood protection training
Emelie Hindersson (Karlstad University)

Chair

» *Lars Nyberg (Karlstad University)*

Main aspects of this section

» Which target groups do we HAVE for capacity building in FRM? Which do we reach yet/which not?
» What are the main important issues for capacity building actions?
» What are the best tools/approaches?
» What has to be improved in capacity building?
» List of future improvements.

Final Session / Completion

» Conclusions from Presentations and Discussions of the Conference and the Workshop

Discussion

» What did we learn?
» What are our Conclusions?
» What are our Messages?

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Recommendations / conclusions from the conference

Session I:
Flood Risk Management Planning-Cycle
Process – Actors – Tools

Session I has dealt with the Flood Risk Management Cycle from a more structural point of view. It focused on the process itself, the relevant players and supporting tools.

Whether there should be a standardized approach or not has been identified as a very fundamental question. A minimum of standardization is already given by the flood directive, but, according to the common opinion, further standardization seems not really desirable. The free approach should be seen as a benefit. It has the potential to take national specifics or site-specific conditions into consideration. Nevertheless it has been stated that even if variety and individual interpretation and configuration is important, respectively necessary, guidance is also needed to some extent. Priority will be given to a selection of good examples and experiences over strict guidelines. An exchange of experiences is more important as top-down guidance. Single plans have to feed the other levels.

But notwithstanding the individual implementation strategy experts stated that a common speech is important, as there is the danger of losing accuracy of terminology when speaking on international level. Proper definitions and common terminology will be very helpful. Finally, it can be noted that there is the demand for further experiences.

A further and very elementary question is dealing with the appropriate level and best point of time of stakeholder involvement. Which players have to become integrated into planning process and when?

SAWA ventured out onto new territory when it tried to involve "the relevant" stakeholders into planning process. It can be stated that it is not always easy to define the relevant group of stakeholders as not the same group of stakeholders does necessarily be involved in all topics. The appropriate selection of the stakeholders depends on the specific aim or decision to be made as well as on the level of detail. On which level (local, regional) to start with participatory processes is a fundamental question. The right time of participation shall be selected very carefully. On local level it is important to start early as people (stakeholders) are personally affected. In general it can be noted that participatory processes need time. The experience has shown that 2 years are a realistic period of time. When it comes to the consideration of learning aspects as well, like practiced for example in the LAA approach, even more time is needed in advance. A stakeholder analysis might be helpful in advance. That means before starting with the planning process in detail.

In conclusion it can be noted that recommendations and/or even more shared experiences for the participatory process will be very helpful. There is a strong interest on further experiences.

Tools, like Decision-Support-Systems, are able to support the planning process or at least parts of it. But, the specific tool has to be selected very carefully regarding the appropriate time, the relevant decision that has to be made and the number and specification of people involved.

The varieties of tools, which are able to support the planning process, are manifold as the great number of decision to be made during planning process. SAWA developed different tools focusing on the selection of appropriate adaptive measures whereas the target groups as well as the necessary know how for application differs.

It can be stated that those kinds of tools are only a vehicle to support and possibly facilitate the decision process. The decision itself always must be taken by the expert(s).

Session II:
Flood Risk Management Planning-Cycle
Measures – Techniques – Efficiency / Impact
Within SAWA a list of different types of synergetic measures has been developed

Flood Resilience Measures

Capacity Building
- Flood Maps
- Flood Risk Maps
- Public Engagement

Decision Support Tools
- Decision Support Tools – Management
- Decision Support Tools – Planning
- Decision Support Tools – Public Engagement

Land Use Control
- Building Codes / Regulations
- Zoning Ordinances / Zoning Maps

Adapted Land Use
- Afforestation
- Conversion to extensive grassland
- Land Set-aside
- Managing Cultivation for Flood Risk Management
- Depth Loosening
- Green Corridors / Strips

Contingency Measures
- Flood Protection, Evacuation and Rescue Plans
- Flood Forecasting and Warning Services
- Flood Control – Emergency Operations
- Mobile / Demountable Flood Defence Devices
- Flood Disaster Recovery Plans
- Insuring of Flood Risks
- Reserve Funds for Flood Consequences

Flood Preparedness
- Flood Adaptive Architecture

Flood Probability Reduction Measures

Sustainable Urban Drainage Systems
- Keeping / reconstituting groundwater
- Evaporation and retention structures
- Filtering and retention structures
- Infiltration and retention structures
- Rainwater Harvesting

Controlled Surface Conveyance
- Conveyance Structures
- Multi-Functional Spaces

Watercourse Restoration
- Relocation of Dikes
- River Restoration
- River / Floodplain Maintenance – measures influencing roughness

Traditional Flood Defense Measures
- Flood Defense Walls / Embankments / Dikes
- Flood Safety Standards
- Retention Structures
- Optimizing the Operation of Retention Structures
- Groundwater Defense

It has been agreed on that a list of measures would be helpful to describe their impact in flood retention in FRM-Plans as long as all relevant parameters are considered. The restrictions are mainly based on the following arguments. First of all it seems to be important that multiple criteria have to be addressed. These multiple criteria should focus on the respective flood retention potential, the influence on groundwater levels as well as on the water quality. They should include aspects like social factors (recreational, who is put at risk the most?) and public acceptance (very different aspects for different measures) and they should also consider cost-benefit ratios (different timescales, tangible, not tangible). Beside those aspects innovative ideas and approaches are always required and should also be taken into consideration. Innovation is for example needed as regards Sustainable Flood Retention Basins. They have been considered as having a big impact in flood retention.

When it comes to the selection of the most suitable measure or set of measures the appropriate scale regarding space and time has to be considered. Further it can be stated that an evaluation of the effectiveness on catchment scale would also be useful.

Rigid systems seem to be less effective than a flexible approach when the best alternatives have to be brought into decision making process. To share experiences might be more useful for the selection of the most appropriate measure than a standard catalogue of measures, but a catalogue of measures might support the consideration of alternatives. It can be stated that flexible & generic tools for decision making would be very helpful. The benefit of coupling measures (physical) to instruments (strategies/concepts – administrative informal, economic) could be identified.

Session III:
Capacity building – Dissemination – Education

The effectiveness and relevance of any kind of capacity building measure is based on the respective target group addressed. Individuals involved, addressed or even affected by the flood risk management planning processes or its results are very different. The public has quite a different approach to flood risk issues than pupils and students, and yet a different approach than experts like water managers and spatial planners or municipalities and high politicians. Each group has to be addressed in very different ways as interests, specific know-how and concernment varies extremely.

As logical consequence only a broad variety of dissemination tools and channels will be able to address such a manifold group of individuals. As only one result of SAWA it can be stated that tools in general are very suitable for involving other disciplines and communicating with them. When we are thinking about appropriate tools we have always to define which target group we want to address. Norway for example made very good experiences with rain gardens in schools, which represents a combination of flood retention measure and learning site. Interactive Games are also confirmed by the partnership to be a good tool to raise interest and transport knowledge especially for pupils, students and the public. With the LAA-approach followed in SAWA a participatory process has been realized where very different stakeholders (citizens, water managers and municipalities) worked together on flood risk management planning issues on local level. The planning tools used on different levels have been identified as having great potential and might be used for both economic (CBA) and technical (planer client) issues.

In conclusion SAWA community can give three general recommendations in terms of capacity building issues.

- SAWA partnership recommends creating win/win concepts. Early coordination, adequate information, active involvement and increased transparency are important aspects of a planning cycle and are able to support and enrich both sides – the executive party and the affected persons.
- SAWA partnership also recommends creating interconnections.
- Active knowledge exchange is very important also on trans-national level. One of the SAWA main aims was to strengthen international cooperation and to really work trans-nationally. It can be stated that trans-national cooperation really enriches all parties involved. Personal experiences, knowledge and networks benefit from an active and frankly cooperation.

List of Participants

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SAWA Project
Background and Performance

Background Information

Who is SAWA? – The Organisations and Institutions

GER
- » Ministry of Urban Development and Environment; Agency for Roads, Bridges and Waters (LSBG)
- » HafenCity Universität Hamburg (HCU)
- » LEUPHANA Universität Lüneburg
- » Acriculture Chamber of Lower Saxony (LWK)

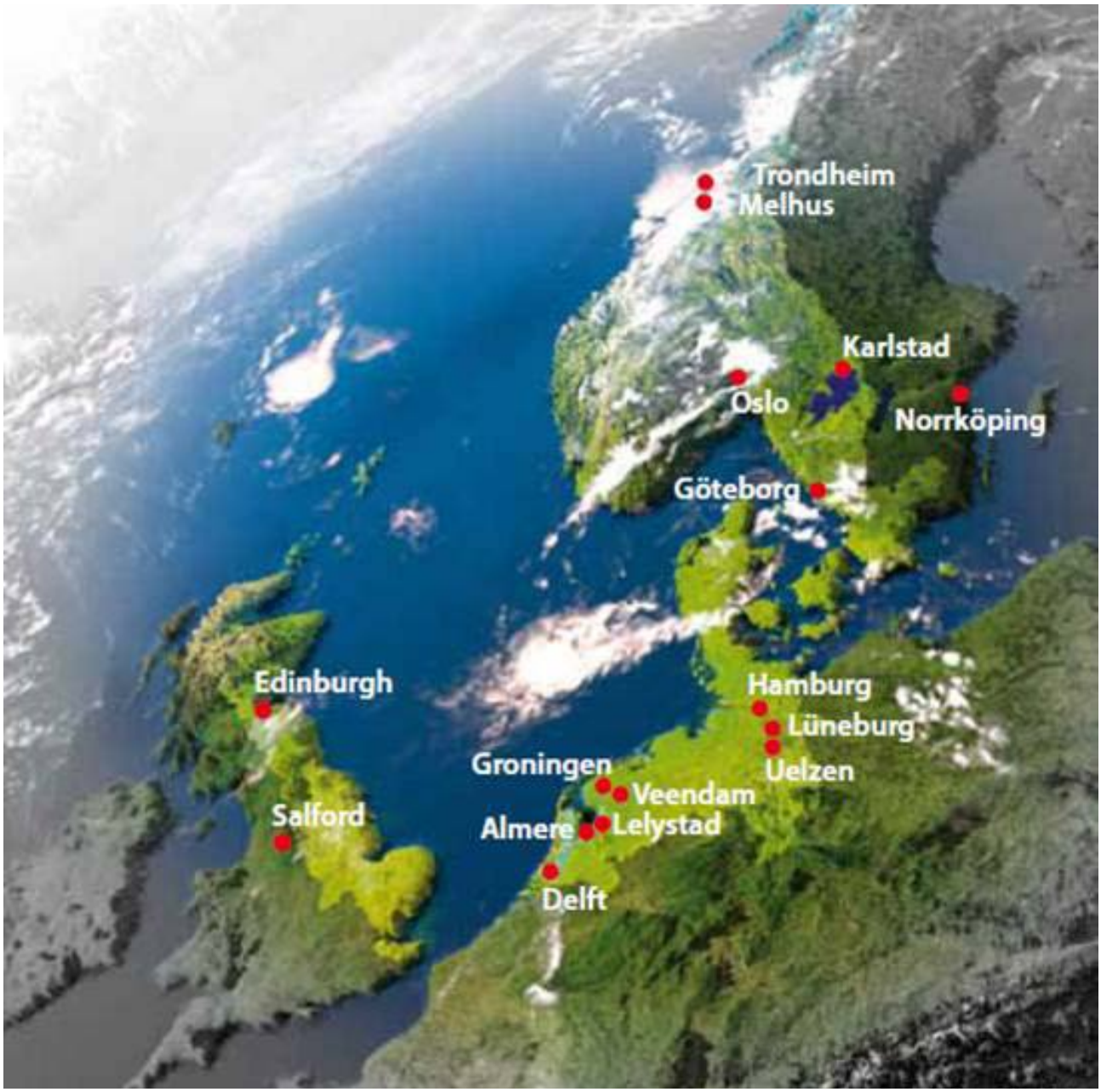
NL
- » Province of Flevoland
- » Waterschap Zuiderzeeland
- » Waterschap Hunze en Aa's
- » Waterschap Noorderzijlvest
- » Waterboard of Delfland

NOR
- » Norwegian Water Resources and Energy Directorate (NVE)
- » Norwegian University of Science and Technology (NTNU)
- » Melhus Municipality
- » Norwegian Meteorological Institute (met.no)

SWE
- » County Administrative Board of Värmland
- » Swedish Meteorological and Hydrological Institute (SMHI)
- » County Administrative Board of Västra Götaland
- » Karlstad University
- » SGI, Swedish Geotechnical Institute
- » City of Karlstad

UK
- » Heriot-Watt University

Where is SAWA? – The Cooperation Area



What is SAWA ? – The Approach

SAWA – Acronym

SAWA is the acronym for Strategic Alliance for Integrated Water Management Actions. Five countries from the North Sea Region have formed a long-term partnership of expertise in order to learn from each other on how to manage water and its risks. Together they develop measures not only for dealing with future flood risks, but also to enhance the quality of life for those who live in close proximity to water.

SAWA – North Sea Region

SAWA is an alliance of five North Sea Region countries co-funded by the EC. Together they find new ways in water management and reduce the vulnerability of society to the risks of flooding.

SAWA – EC-Policy

SAWA follows European strategies and guidelines for deployment at a local level. Our projects will drive the implementation of the EC-Flood Directive (FD) and the Water Framework Directive (WFD).

SAWA – Climate Change

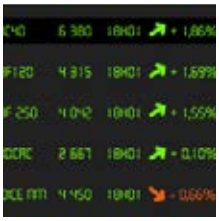
Flood risks will become more frequent due to climate change. Within our SAWA-partnership we will develop adaptive measures for local regions to control flooding effectively, adapt to the challenge of increasing heavy rain and raising sea levels.

SAWA – Environment

SAWA will show that living near flood-prone areas is not only risk but also fun. Water can create magnificent landscapes with lavish flora and diverse fauna. SAWA will encourage an open dialogue about flood risks and the benefits of living near water and therefore help communities to adapt to a changing environment

SAWA – Quality of Life

SAWA aims to integrate water resources into daily life. Excellent water quality and a safe and healthy environment are essential for our well-being. SAWA will develop projects for people to identify with their area of living and feel good and safe about living in flood-prone areas.



SAWA – Economics

SAWA will show that local water management can have a direct impact on business development close to flood-prone areas. Communication of the risks and development of adaptive measures at a local level to reduce the risk of substantial damage will increase the sense of safety for potential investors. It will reassure them with regard to long-term investments, such as buying property, building houses and, at the same time, help to develop a prosperous region with a good infrastructure and an increasing number of jobs.

SAWA – Governance

SAWA will communicate with stakeholders and decision makers at all levels in order to create awareness and acceptance for the issues related to flood risks and sustainable water management. This implies bringing all parties together and focussing their attention on necessary actions and agreement on what needs to be done in riverine regions.

SAWA – Education

Education and capacity building activities are key elements within the SAWA-project in order to create awareness and good will for the issues of flood risks and sustainable water management. We therefore plan a series of activities such as the initiation of an international student exchange programme, sustainable information centres and a host of other tools aimed at engaging the community.

What has SAWA developed? –The Performance

- SAWA Partnership developed 5 Flood Risk Management Plans on national level (SWE, NOR, GER)
- SAWA Partnership developed 1 River Basin Management Plan on national level (GER)
- SAWA Partnership developed 1 cross-border Flood Risk Management Plan (NOR)
- SAWA Partnership developed 10 different DSS Tools (accessible via WIKI (1))
- SAWA Partnership developed 2 Contingency Plans (urban/rural area)
- SAWA Partnership analysed & tested different approaches for stakeholder involvement
- SAWA Partnership developed a Database on Adaptive Measures (accessible via WIKI (1))
- SAWA Partnership developed an Expert Database (accessible via WIKI (1))
- SAWA Partnership developed 7 Sustainable Education Centres
- SAWA Partnership developed a Master Course on Flood Risk Management
- SAWA Partnership produced educational materials & 2 computer based educational games
- SAWA Partnership developed numerous analysis and studies
- SAWA Partnership created numerous reports, books and scientific articles
- SAWA Partnership hold numerous workshops and seminars on national & international level
- SAWA Partnership took part on numerous national and international conferences
- SAWA Partnership created a vivid network on international level

(1) Under construction Link: http://iwawaterwiki.org/xwiki/bin/view/Organizations/SAWA

What has SAWA developed? –The Performance in Detail

Collection of Posters

Adaptive Flood Risk Management – Appoach and Plans

Development of the Flood Risk Management Plan

Wandse, Hamburg, Germany

Wandse SAWA Team

Main Idea

Development of a FRMP Wandse involving key stakeholders.

Approach

» Development and application of a participatory planning strategy for the implementation of a Flood Risk Management Plan (FRMP) at the river Wandse based on broad stakeholder involvement making use of the concept of Learning and Action Alliance (Ashley, 2010, INTERREG Project MARE)
» The strategy is based on a planning cycle subdivided in four main phases (Fig. 1).

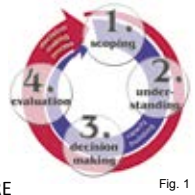


Fig. 1


Fig. 2

For the support of the planning process the following instruments are developed:
» Learning tools: Flood Animation Studio and E- Learning Material/ E- Lectures (Fig 2)
» Decision support tools: Kalypso-Planner Client (http://kalypso.bjoernsen. de/) and Kalypso-FLORETO (http://floreto.wb.tu-harburg.de/) (Fig.3).


Fig. 3

Results

» A document containing Flood Risk Management Plan for the River Wandse
» Improved group dynamics and identity of the LAA Wandse group through social learning activities
» Built capacity to understand risk and its complex system of drivers, pressures and consequences
» Public stakeholders learnt to read and understand flood hazard and risk maps. The consensus has been found that there is a strong need to mitigate flood risk especially regarding the climate change and urban growth projections.

Link to further information: http://laa-wandse.wb.tu-harburg.de/

Contribution to SAWA

» Governance approach for development of a Flood Risk Management Planning
» Tools for capacity building and decision making.

Main Outcomes

» Good understanding of the system is crucial (hazard and risk maps have to be available, drivers & pressures assessed)
» Delivering facts important (such as quantification of the effect of pressures& drivers, NSM)
» The sessions have to be inviting for participants especially in the initial phase
» Dare to try something new.

Also:
» Time and resources intensive process.
» Involves a range of tools and methods (social, hydrodynamic, learning) and needs interdisciplinary teams.

Partners

TUHH Technische Universität Hamburg-Harburg
Landesbetrieb Straßen, Brücken und Gewässer
HCU HafenCity Universität Hamburg

Integrative River Basin Management - Synergies and Target Areas in the Ilmenau Catchment Area

Leuphana University Lüneburg, Germany

Main Idea

Reducing flood risk by identification synergies with i.a. Water Framework Directive, nature conservation, agriculture and others by an integrative river basin management approach.

Impressions of River Ilmenau

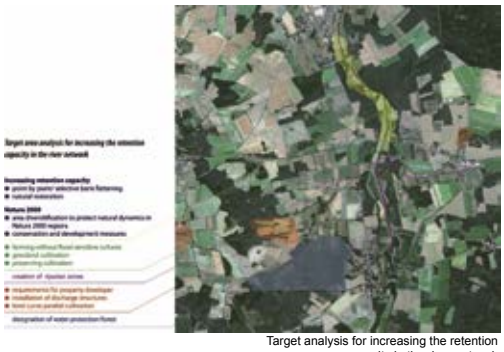
Approach

» Development of a method to identify target areas for prioritised measures and implementation instruments
» Developing and testing the method in the case study area of the Ilmenau river basin (tributary to river Elbe/North Germany)
» Participation process involving regional partners and stakeholders (discussions with experts, workshops)
» GIS-based spatial analysis to identify areas in the catchment relevant to flood protection measures (e.g. flood source areas, potential risk areas) and target areas for the implementation of measures to reduce flood risk and improve water quality.

Methodology for identification of target areas for syneretic measures

Results

» Developed method for identification of target areas
» Target area analysis for the whole catchemnt of the Ilmenau river basin
» Catalogue of adaptive measures and overview on instruments for implementation for integrative flood risk management
» The digital „Ilmenau Atas“ which shows the main target areas for pooling synergetic measures
» Cooperation of different regional stakeholders and better understanding about FRM and respective values and goals
» Information and results can be integrated in various plans (master plan for urban development, landscape plan etc.).



Target analysis for increasing the retention capacity in the river network

Contribution to SAWA

» Integrative approach for identification and using synergies of the Flood Directive and Water Framework Directive
» Integrative River Basin Management Plan as an important step towards a Flood Risk Management Plan
» Tools for integrative and knowledge based planning and decision making.

For more information see please Evers et al. (2011) Integrative river basin management – synergies and target areas in the Ilmenau catchment. ISBN 978-3-935786-54-6

Partner

LEUPHANA UNIVERSITÄT LÜNEBURG

Mariele Evers

Monika Tischbierek

Philippe Arndt

Julia Mußbach

Flood Risk Management Plans in Norway

Project Nor4 at NVE

Norwegian Water Resources and Energy Directorate

NVE

Main Idea

Develop draft flood risk management plans for two rural pilot river basins, Gaula and Tana.

Karasjohka, Tana river Basin

Approach

» The Gaula Flood Risk Management Plan was developed in cooperation with Melhus municipality.
» The Tana Flood Risk Management Plan was developed in cooperation with Karasjok municipality and in dialog with the Sami parliament in Norway.
» Employees at different departments in the municipality gave ideeas and feedback to the draft of the plan.
» The coordination between the Flood Directive and the Water Framework Directive was considered during the process.

Results

» More knowledge concerning how different measures works under local conditions is needed.
» The process of involving stakeholders when identifying measures that gives the best benefit is time consuming, but will add value if measures are familiar to those involved in the process.
» Lack of legislation makes involvement of stakeholders more difficult, especially when resources within the administration are scarce and other tasks are decreed by law. Legislation and clear guidelines can make the process of making flood risk management plans more manageable.
» Introducing non-structural understanding and an indigenous perspective has catalysed new and future-orientated thinking in the field of flood risk management.

Kvål, Gaula river basin (photo: Bloom Geomatics)

Link to further information: www.sawa-project.eu

Contribution to SAWA

» Two rural FRMPs:
  › FRMP Tana
  › FRMP Gaula in progress
» Good practice recommendations for implementation.

SAWA co-workers: Eirin Annamo and Oddrun Sunniva Waagø, NVE

Partner

MELHUS kommune

Flood Risk Management Plan in Sweden

County Administrative Boards of Västra Götaland and Värmland

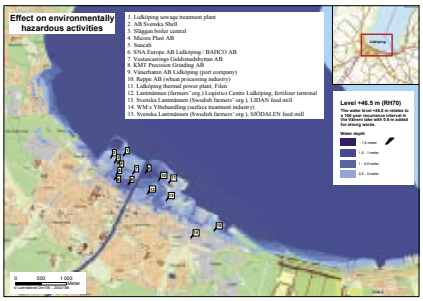
Main Idea

» To develop a draft action plan for how to deal with flooding in the Municipality of Lidköping, Sweden.
» To use the approach of a flood risk management plan (FRMP) according to the Flood Directive and demonstrate the importance of using a bottom-up perspective in developing the plan.

Presentation for the Lidköping Municipalaty

Approach

» Lidköping is situated on the southern shore of Lake Vänern. It is low-lying and at great risk of being flooded by the lake especially even more so in the light of climate change.
» The work started in Autumn 2010. A working group was created consisting of representatives from the two county administrative boards' SAWA-team and the municipality's different departments: Planning and Construction, Water and Sewage, Heat production, Environment and Health, provision of Electricity, provision of Broadband and Crisis Management.
» The working group had four workshops, which resulted in a draft action program based on the vulnerability of each sector.
» Based on the flood risk map produced earlier within the SAWA project, a thorough analysis was done of what happens when the water level of Lake Vänern rises centimeter by centime ter and a preliminary list of possible adaptive measures put together. Interesting was to notice the importance of the interdependence of the different sectors: if electricity goes no pump will work, if broadband connections are cut off crisis management will be seriously hampered etc.
» During one of the workshops an invited specialist held a lecture on the concept of cost-benefit analysis.
» Measures recommended ranged from improving current routines and basic data about the municipality to the more challenging tasks of protecting or displacing the main district heating and sewage treatment plants.



Results

» The discussions in the working group were at times intense and interesting and demonstrated the benefit of people from the different departments sitting together at the same table. This resulted in an agreement on the most urgent measures to be carried out.
» The Municipal Executive Board has now decided to have the three most important measures proposed in the draft action program investigated more in detail: how to secure the sewage treatment and central heating plants and how to displace a low-lying electrical substation.

SAWA Sweden co-workers:
Susanna Hogdin & Johan Mannheimer

Contribution to SAWA

» One urban FRMP in progress
» Good practice recommendation on how to deal with FRMPs for municipalities in Sweden and elsewhere in the EU.

Partners

Länsstyrelsen Värmland

LÄNSSTYRELSEN VÄSTRA GÖTALANDS LÄN

Preliminary Flood Risk Assessment in Norway

Project Nor4 at NVE

Norwegian Water Resources and Energy Directorate

NVE

Main Idea

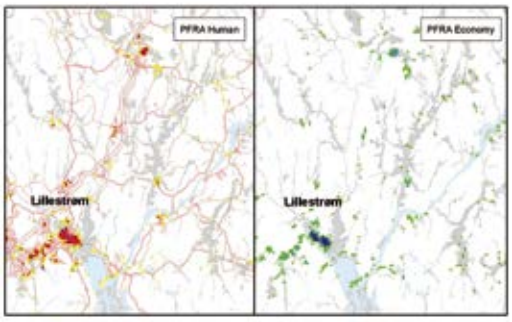
A preliminary flood risk assessment can be carried out by making flood susceptibility maps that aim to identify potential high risk areas for more detailed hazard and risk mapping.

GIS-Approach

A statistical relation between catchment area and maximum water level rise was used in a GIS-analysis to calculate the flood susceptibility areas. These were combined with population density and economic values to calculate the potential flood risk.

Results

Aggregating the results to areas with a significant risk, maps showing the potential spatial distribution of high risk areas can be created to aid the decision making process of pointing out the areas vulnerable to significant flood risk.



Contribution to SAWA

Considering the premises of doing a preliminary flood risk assessment based on already available or readily derivable information, the results from the GIS-analysis are acceptable as a first approximate estimate of areas of significant flood risk. The GIS approach has proved to be a helpful tool in the process of pointing out areas with potential flood risk.

Climate Impacts and Flood Risk Management

Project Nor5 at NVE

Norwegian Water Resources and Energy Directorate

NVE

Main Idea

To develop and apply an integrated framework for assessing and delivering climate impact model results, including the uncertainties underlying those projections. Target end users are municipalities and others engaged in flood hazard mapping and in flood management

Approach

- To develop estimates for likely changes in 200-year flows for Norway
- To estimate the uncertainty in the projections
- To develop regional guidance for use of projections by water managers
- To investigate methods for communicating the impacts of climate change on flooding.

Methods: The development of projections for likely changes in flooding due to climate change uses a series of linked models and analyses.

Outcomes

Projected changes in the 200-year flood have been developed for the whole of Norway as part of NVE's SAWA project work. It is anticipated that some portions of Norway will be subject to large increases in flood hazard, whilst others will experiences a reduced flood hazard in the future. This difference is due to the relative importance of extreme rainfall vs. snowmelt in generating floods. Under a future climate, warmer winter temperatures will lead to a reduced snow volume and an earlier snowmelt, whereas extreme precipitation will increase throughout the country.

Regional guidance has been developed to assist flood managers in interpreting the projections for changes in flooding (Lawrence and Hisdal, 2011) see an example: fig. 3.

Discussions are now taking place in Norway as to the best method for communicating these results to local municipalities in their work with flood management. Possibilities include:

- Illustrating likely changes in flood due to climate change on the standard flood hazard map prepared by NVE
- Preparing a separate flood hazard map which illustrates inundation under a future climate
- Reporting the likely effects of climate change on inundation in the report which accompanies the flood hazard map (but not actually illustrating it spatially)
- Reporting the likely impact of climate change on flood hazard in a letter to the municipality (i.e. in a separate communication from the flood hazard map for the area).

The final decision as to which method(s) is used will taking after discussions with those engaged in flood hazard mapping and in flood management.

Referens: Lawrence, D. and Hisdal, H. 2011. Hydrological projections for flood in Norway under a future climate. NVE Report 5-2011.

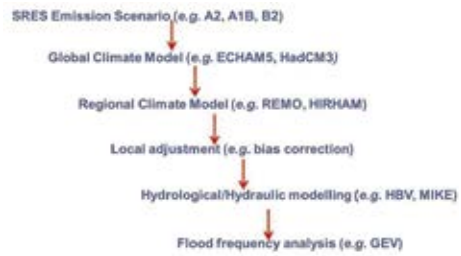


Figure 1. Chain of linked models used for analyzing climate change impacts on flood frequency.

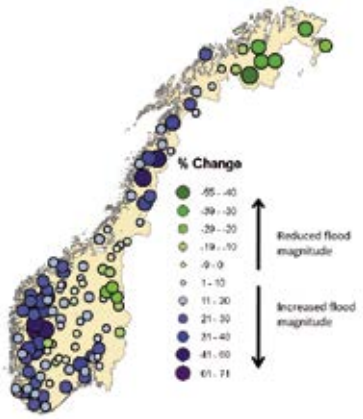


Figure 2. Projected changes in the 200-year flood between 1961-1990 and 2071-2100 based on the median of an ensemble of projections.

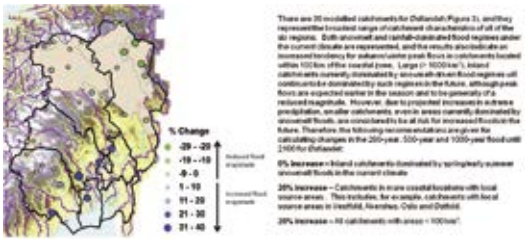


Figure 3. Example of regional guidance for expected changes in flooding – Region 6 (Østlandet)

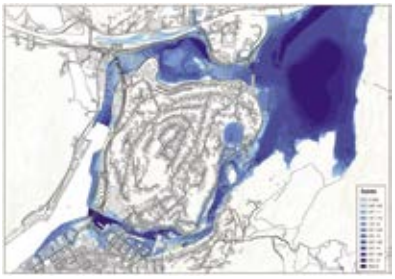


Figure 4. Inundation depths for the 200-year flood for an area in southwestern Norway, taking account of a 40% increase in peak discharge and a 1.26 m increase in sea level

Climate Change and Agriculture

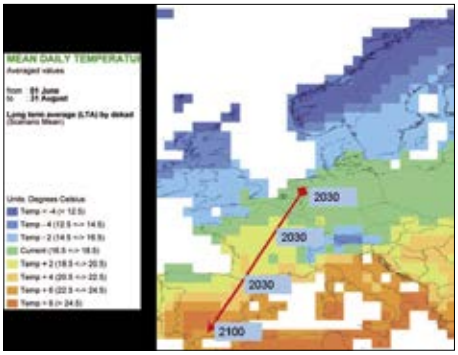
Province of Flevoland, The Netherlands

Main Idea

Climate proof flood risk management needs climate proof spatial and economical development.

Approach

In the Netherlands, the risk of flooding is increasing due to climate change and subsidence. Flevoland wants to anticipate on this process in long term spatial policies and water management. The province has regulations for both fluvial and pluvial flooding, with separate standards for both. The policy and the standards depend among others on land use and economic value. In the project “climate and agriculture in Flevoland”, we have tried to make predictions on the long term land use, taking climate change into account. These predictions serve as a basis for flood risk management plans.



Source: H. Meinke, J. Verhagen, D. van Kraalingen and J. Neeteson, unpublished

Results

» Agriculture in Flevoland has a bright future

» Economic strength improves with climate change…

» …provided protection against flooding and fresh water availability are kept up to the present standard

» Increased flood risk, prolonged draught and increased pressure of pests and di seases are main climate change impacts

» Key factors are healthy soil structure and fresh water availability

» Farmers and government need each other.

Link to further information:
http://climatechangesspatialplanning.climateresearchnetherlands.nl/themes/adaptation


“I don’t have any cash flow problems. It all washed away in the flood.”

Contribution to SAWA

Climate change impacts need to be adressed in Flood Risk Management Plans, not only at the level of water related impacts, but also at the level of economic and spatial impacts. This project shows a way of incorporating climate change.

Partners

PROVINCIE FLEVOLAND

Dicision Support Tools

Adaptation Possibilities and Evaluation

Swedish Geotechnical Institute (SGI)

Main Idea

The aim is to identify potential solutions for flood risk management and to test method to evaluate their sustainability.

Foto: Water Sensitive Urban Design, www..wsud.org, 2011-01-19

Approach

» Compile available information on adaptation measures (pros, cons and geotechnical aspects)

» Test and apply matrix based decision support tool (MDST),developed in the sister project (Interreg IVB) Climate Proof Areas (CPA) on potential adaptation measures in flood risk areas.

› Desk top (Lidköping, Sweden)

› Meeting with stakeholder groups (Lidköping, Sweden and Melhus, Norway) to go through the process of the (MDST)

› Exam work by student of Mariele Evers, University Leuphana, in Germany.

Link to further information:
www.swedgeo.se/upload/publikationer/Varia/pdf/SGI-V613.pdf
www.swedgeo.se/upload/publikationer/Varia/pdf/SGI-V619.pdf (available Jan. 2012)

Results

» Report on compilation of information on adaptation measures (pros, cons and geo technical aspects) (SGI Vara 618 in Swedish, SGI Varia 619 in English)

» Tested, and a basis for upgrading/updating, MDST.

Contribution to SAWA

» Report on compilation of information on adaptation measures (pros, cons and geo technical aspects)

» Decision support tool to be applied and tested at pilots and other case studies within SAWA.

SAWA co-workers:
Ramona Bergman & Yvonne Andersson.Sköld

Sustainable Flood Retention Basins (SFRB) to Control Flooding and Diffuse Pollution

The University of Salford, Civil Engineering Research Centre

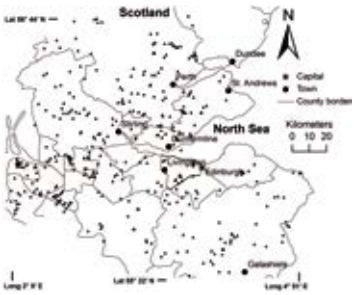
Main Idea

Our main idea within the project is to develop a toolbox based on the SFRB Concept to solve integrated water management problems for the benefit of practitioners across the European Union.

Approach

Our approach has been to:

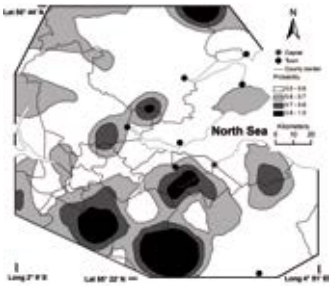
» Critically review wetland systems knowledge and to develop a SFRB guidance manual.
» Statistically classify SFRB in partner countries, such as the United Kingdom and Germany.
» Use multi-label classification techniques to recognise the multi-purpose use of SFRB.
» Develop a feature selection methodology that helps practitioners in prioritising variables.
» Use geostatistics to identify sites optimal for future capital flood control investment.
» Apply self-organizing map models to determine costly variables with inexpensive ones.
» Determine SFRB dam failure risk and to identify risk hotspots for detailed assessments.



Example case study area showing sustainable flood retention basins

Results

» Development of a SFRB guidance manual to identify and characterise water bodies.
» Production of international and generic SFRB classification tools for different user groups.
» Creation of a prioritisation tool for 55 SFRB variables of great importance for various purposes.
» Develop a feature selection methodology that helps practitioners in prioritising variables.
» Development of a spatial statistics tool useful in flood asset management planning.
» Provision of a dam assessment tool that can be used in flood risk management practice.



Example of applying disjunctive kriging for the variable Managed Mean Flooding Depth (m, exceeding 3 m)

Contribution to SAWA

» Scholz M. (2008), Classification of Flood Retention Basins: The Kaiserstuhl Case Study. Environmental & Engineering Geoscience, 24 (2), 61-80.
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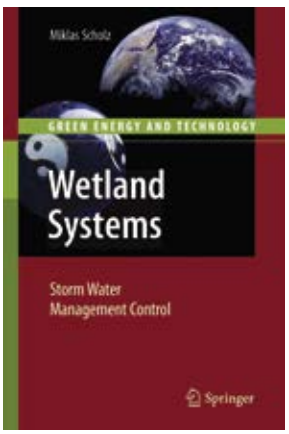
» Scholz M. (2010), Wetland Systems – Storm Water Management Control. Series: Green Energy and Technology. Springer Verlag, Berlin, Germany.
» Scholz M. and Yang Q. (2010), Guidance on Variables Characterising Water Bodies including Sustainable Flood Retention Basins. Landscape and Urban Planning, 98 (3-4), 190-199.
» Robinson M., Scholz M., Bastien N. and Carfrae J. (2010), Classification of Different Sustainable Flood Retention Basin Types. Journal of Environ mental Sciences - China, 22 (6), 898-903.
» McMinn W. R., Yang Q. and Scholz M. (2010), Classification and Assessment of Water Bodies as Adaptive Structural Measures for Flood Risk Management Planning. Journal of Environmental Management, 91 (9), 1855-1863.
» Yang Q., Shao J., Scholz M. and Plant C. (2010), Feature selection methods for characterizing and classifying adaptive Sustainable Flood Retention Basins. Water Research, 45 (3), 993-1004.
» Yang Q., Scholz M. and Shao Y., Application of Spatial Statistics as a Screening Tool for Sustainable Flood Retention Basin Management. Water and Environment Journal (in press).
» Scholz M., Hedmark Å. and Hartley W., Recent Advances in Sustainable Multifunctional Land and Urban Management in Europe: a Review. Journal of Environmental Planning and Management (in press).
» Yang Q., Shao J., Scholz M., Boehm C., Plant C. and Tumula P. D., Multi-label Classification Model for Sustainable Flood Retention Basins (sub mitted to a journal).
» Scholz M., Yang Q. and Shao J., Risk Assessment for Sustainable Flood Retention Basins in Central Scotland and Baden (submitted to a journal).
» Scholz M. and Yang Q., Novel Method to Assess the Risk of Dam Failure (submitted to a journal).
» Danso-Amoako E., Hartley W., Curwell T., Nickolas Kalimeris, Piotr Grabowiecki and Miklas Scholz, Predicting Dam Failure Risk for Sustainable Flood Retention Basins: a Generic Case Study for the Wider Greater Manchester Area (submitted to a journal).
» Yang Q., Shao J. and Scholz M., Using Self-organizing Map Model to Predict Sustainable Flood Retention Basin Types and Characteristics (submitted to a journal).



New textbook on Wetland Systems management

Flood Forecasting in a Catchment 0.93 m -AD

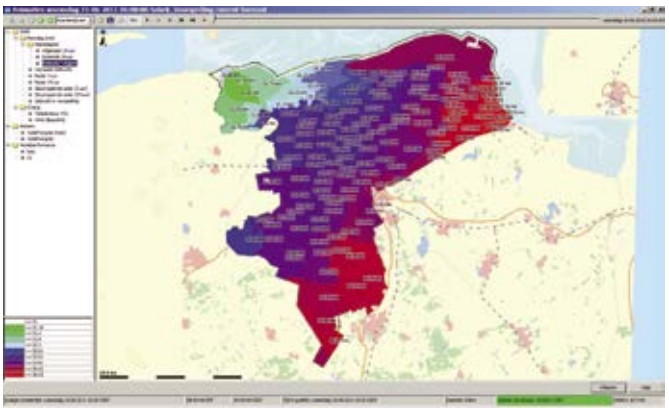
Regional water Authority Noorderzijlvest, The Netherlands

Delft-FEWS as Flood Early Warning System

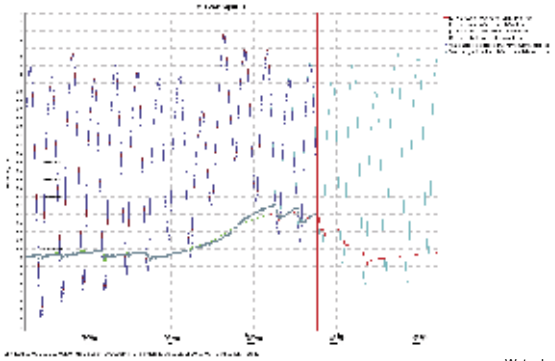
Objective: an operational Flood Early Warning System

- » Support for emergency response teams
- » Connect operational and strategic water management (increase water system knowledge)
- » A versatile and accessible platform
- » Access to (international) knowledge community.

Link to further information: info@noorderzijlvest.nl



5 Day Precipitation Forecast

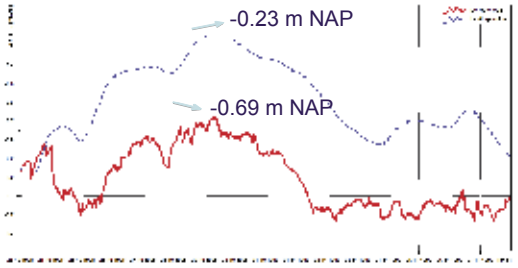


Water Level Forecasts

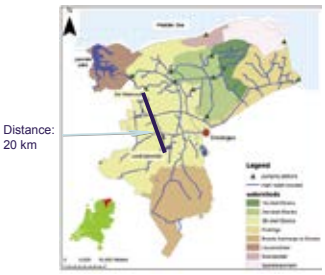
Partners

Waterschap Noorderzijlvest

Deltares
Enabling Delta Life

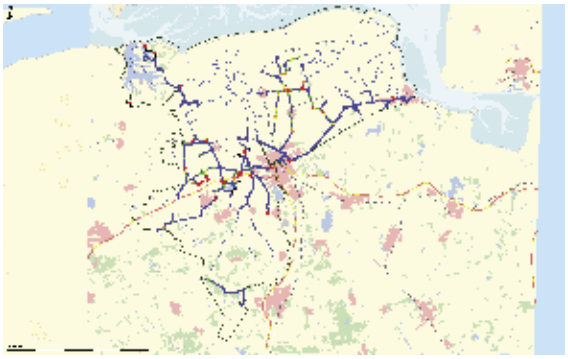


Highest Alarm Level:
-0.33 m NAP



Incentive: Flood Event in 1998

Delft-FEWS As Spider in the Web



Remaining Freeboard

Improvement of a DSS Used for Waterlevel Management

Waterboard of Delfland, The Netherlands

Main Idea

To improve a DSS used to manage the waterlevels in the main canal system, by adding more input variables and by refining it's modelling.

Heavy rainfall September 2001 downtown Delft

Approach

» Add input parameters to the DSS on the current waterload onto the main canal system by the secondary canalsystem

» The secondary pumping stations (~100, plus it's management system) are upgraded to automatically deliver their throughput to the DSS

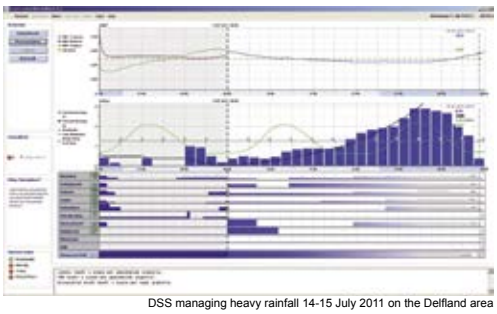
» Add precipitation radar data to the DSS.

Results

» The project that let the secondary pumping stations report their current throughput is completed (TA-project)

» The project to upgrade upgrade the DSS' modelcore to include the aforementioned data is well underway (this project will also enable the DSS to run the main pumping stations in a more energy efficient way).

Link to further information: The SAWA Waterwiki has entries on this DSS:
http://www.iwawaterwiki.org/xwiki/bin/view/Articles/DecisionSupportTools-Management



DSS managing heavy rainfall 14-15 July 2011 on the Delfland area

Contribution to SAWA

» Several entries in the waterwiki

» Participation in discussions on how to share experiences and knowledge

» Presentations on the function of waterboards in the Netherlands

» Presentations for several international delegations and groups of students.

Co-Partners

SAWA co-workers: Jeroen den Ouden and Dolf Daal

Adaptive Measures

Flood Control and Prevention - in Cooperation with Rural Development to Reduce the Inundation Risk on Agricultural land

Chamber of Agriculture Lower Saxony, Germany

We want to

» Reduce the inundation risk for farmers

» Minimize the inundation caused damage for farmers

» Support farmers to protect livestock and themselves.

rural planning
water management
flood control
prevention
water retention

We work on

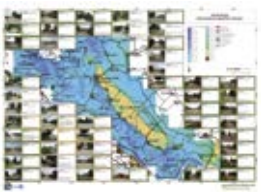
» **Livestock evacuation plan** for the municipality Amt Neuhaus to rescue livestock in case of a flood event

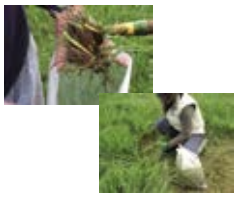
» **Special grazing management** on inundated areas to cope with the pollution caused by deposition of heavy metals and dioxines in order to support a profitable and safe land use for farmer

» **Mail warning service** for farmer and citizen to provide information about water le vels and flood water of the river Elbe

» **Information brochure** "Flooding and Agriculture – How do I protect my farm?" pro-vides information about risks and adaption possibilities of farmers to cope with high water stands.

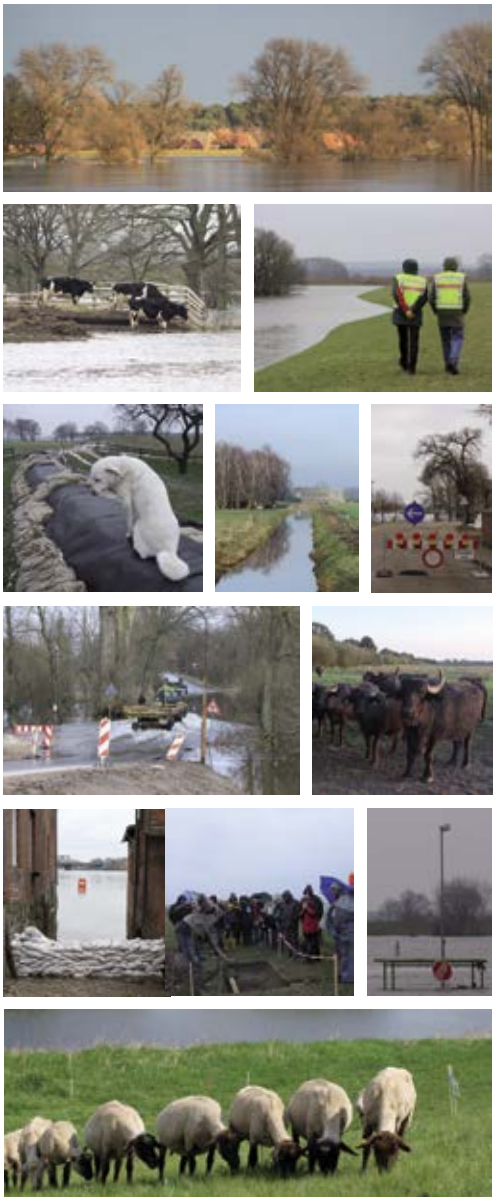
Link to further information: http://iwawaterwiki.org, http://www.lwk-niedersachsen.de





Contribution to SAWA

» We give agricultural knowledge to SAWA.
» For the transnational inventory of current strategies and experience we evaluate the flood mitigation potential on farmland and assessed the risk of pollution on flooded farmland at the River Elbe.
» Measures on farmland are important non-structural measures and are explained at the Water-Wiki.
» We identified potential conflicts and synergies of river basin management and agri-culture. This contributes to developing good practice recommendations for integra ted floodrisk management on a river basin scale.



Partner

Landwirtschaftskammer Niedersachsen

Measures to reduce flood risks

Regional Water Authority Hunze en Aa's, The Netherlands

Jan den Bester

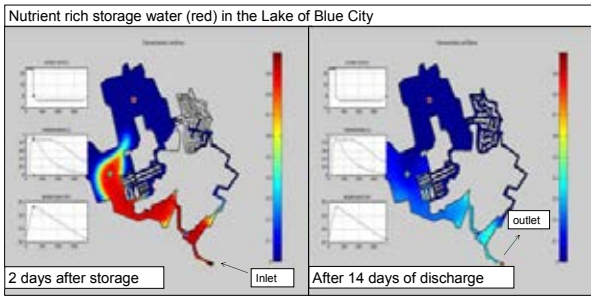
Main Idea

Develop and refine flood risk reducing maesures.

Approach

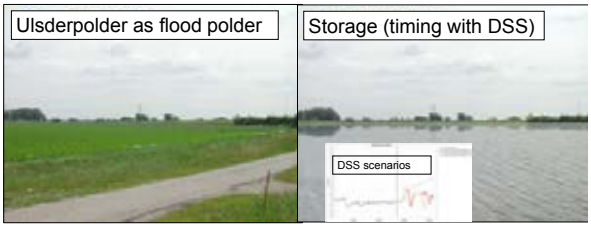
- The DSS for timing of operation of flood reducing measures was improved by better rainfall forecast (from 2 days to 3 days), a better interface based on new more sustainable software.
- Hydrological and ecological models have been made tot study the effect of peak water storage on water qualitiy for the lake of the Blue City.
- Plans have been made with stakeholders to combine river restoration and upstream retention for the small rivers "Achterste Diep" and "Pagediep".

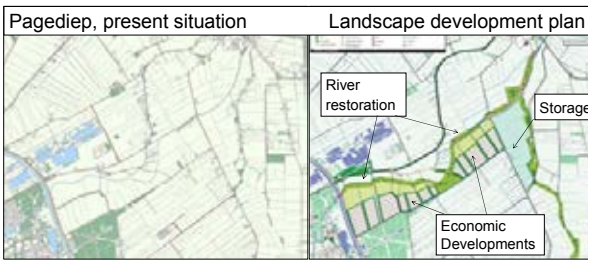
New lake (since 2006) of the Blue City



Results

- Better flood control by an improved DSS to forecast three days in advance the effects of measures, like inundation of a flood polder, on the waterlevels.
- The effect of peak water storage on water quality of the lake of the Blue City is reduced by making the outlet close to the storage inlet.
- A landscape development plan for the river "Pagediep". It combines river restoration and water retention with economic development. The plan invites investors and will make land use change happen. The first investors have already started.
- More experience with finding coalition partners to combine water measures with other developments, like with new urban area (Blue City and with WFD-goals and wishes for economic development (Pagediep).





Contribution to SAWA

- Presentations on international workhops and Mid Term Conference.
- Contributions to WP1 end report.
- Several measures in SAWA wiki.

Adaptive Flood Risk Management

City of Karlstad, Sweden

CITY OF KARLSTAD

Main Idea

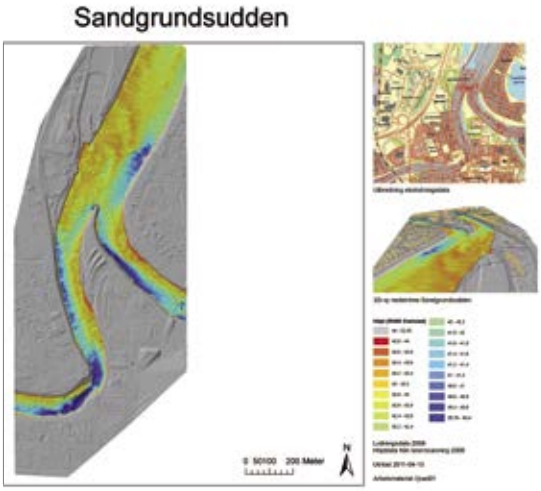
Karlstads SAWA project is a proceeding of the interreg IIIB North Sea project FLOWS with the continuing of the investigation of how groynes can change the distrubution of the flow in the river Klarälven. We have had three projects:

A. Further numerical modeling of groynes to produce the necessary information to invest in groynes upstream the branching point of the river Klarälven.

B. Producing an EIS for permit for installation of groynes.

C. In-depth studies using Risk Cost Analysis to improve the decision support systeme for better planning of future exploitation of housing and other buildings. Improve the knowledge about the economic consequences of floods and costs for flood re - sistance in the city of Karlstad.

In addition to these three projects Karlstad municipality is a pilot area in the Sweden.



Results

» The study of the effect of groynes in Klarälven is now finished and showed that groy - nes will not have the desired effect as hoped for. Therefore the City of Karlstad will not proceed with the EIS (environmental impact statement) for groynes. The advanced models built for the groynes project have also been used to study the impact of exten- sive dredging in Klarälven delta. This has proved to be a very effective adaptation mea- sure. The municipality will carry out further preparations for extensive dredging in the river. The aim for project B have therefore changed to be an EIS for dredging the river instead of an EIS for groynes. The EIS will be finished in januari 2012.

» The cost-benefit analysis project is running, and will be finished on time. The project aim has turned from being a cost-benefit analysis of Skåre to be a guidance for how to do a cost-benefit analysis with Skåre as a case study. This guidance of how to do a cost-benefit analysis will be an excellent tool for officials who work with flood projects.

» Karlstad has also made a flood risk management plan where Karlstads experience have been used in Sweden 1 project, Where the use of different floods and their conse- quences accordning to the directive 2007/60/EC of the as asessment and management of flood risks are considered.

Link for further information: www.karlstad.se/oversvamning

Contribution to SAWA

To assist with a stakeholders view of how to make a flood risk management plan. To show how to make a cost-benefit analysis guidence and how you can make an EIS for extensive dredging in a river where you have both flood risk and nature protecting to care for.

SAWA co-worker Anna Sjödin

”3-Weier-Control”

Agency of Roads, Bridges and Waters (LSBG), Germany

Landesbetrieb
Straßen, Brücken
und Gewässer

Main Idea

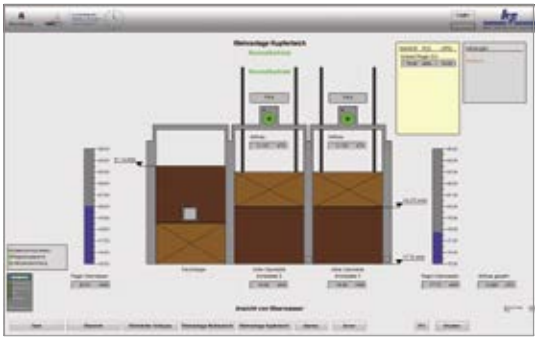
Estimating the weir control capacity and developing a flood management practice for the river Ammersbek.

Approach

The system behaviour of the Alster catchment down to the sluice of Fuhlsbüttel (middle Alster) was studied by analysing several river gauging and precipitation data and setting up a rainfall runoff model. Based on the results a strategy was developed to control 3 consecutive weirs with their upstream ponds situated in the mouth of the river Ammersbek flowing into the middle Alster.

Results

Model outputs for different synthetic rainfall hydrographs show that the important floods in the middle Alster are mainly formed in the upper natural catchments. Therefore a weir control in the Ammersbek basin can be considered a reasonable action contributing to flood management in the middle Alster.



Contribution to SAWA

The ”3-Weier-Control” contributes as a cased based reasoning system (technical) on how to integrate adaptive non-structural measures into catchment passed Flood Risk Management Planning.

Co-partner

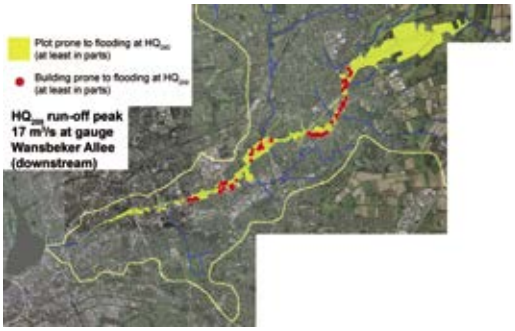
Hamburg

Synergetic Flood Retention for the River Wandse

HafenCity University Hamburg (1/4)

Identifying Synergetic Measures

Synergetic measures allow for reduction of flood risk and help to improve ecological status (potential).



Plots and buildings prone to flooding along the River Wandse main course in a flood event, that statistically occurs one time in 200 years.

Approach

Analisys of flooding dangers in the River Wandse catchment and existing ecological deficits. Screening for measures that meet best the demands for flood reduction and ecological amelioration.

Fast run-off from the rainwater canalisation dominates the flooding events following short and intense rainfall, and is associated with considerable sediment, nutrient and pollutant loads.

Results

In the River Wandse catchment the risk of flooding is moderate, mainly the ecological status necessitates measures:

» **Stormwater management** using Sustainable Urban Drainage Systems reduce effective precipitation, hydraulic stress and sediment / nutrient / pollutant load.
» Establishment of near-natural **secondary floodplains** allow for reconstitution of habitat structure and flatten discharge waves and slow down run-off.
» **Optimisation of** existing **ponded sections** help to break run-off peaks effectively and can be combined with restoration of aquatic animal passage.

Ponded sections in the River Wandse network are not consequently optimized to retain severe floods and pose demand for restoration of aquatic animal passage.

Contribution to SAWA

The measures identified as synergetic measures were investigated closer with regards to technical realisation potentials. Their effectiveness to attenuate severe floods was estimated (see posters 2-4) as well as partially quantified by the project partner TUHH using a run-off-model . Technical potentials and effectiveness were discussed in the pilot scheme to set up a flood risk management plan for the River Wandse catchment (WP1), testing for the acceptance of the measures in integrated water management.

Partners

HCU HafenCity Universität Hamburg

Landesbetrieb Straßen, Brücken und Gewässer

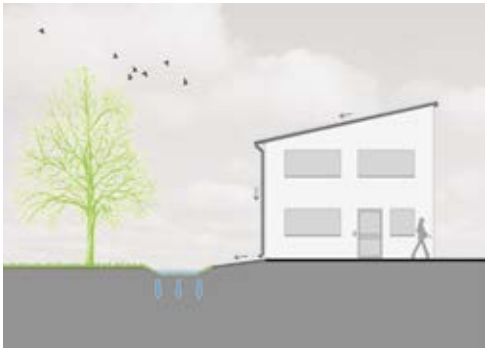
TUHH Technische Universität Hamburg-Harburg

Synergetic Flood Retention for the River Wandse

HafenCity University Hamburg (**2**/4)

Potentials of Stormwater Managment

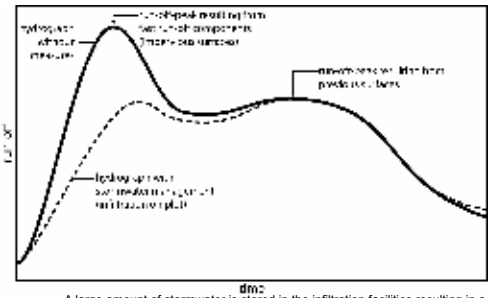
Focus of the investigation was to determine on how many plots for stormwater can be managed on plot using infiltration facilities.



Stormwater run-off from a roof managed on plot using a swale for infiltration.

Approach

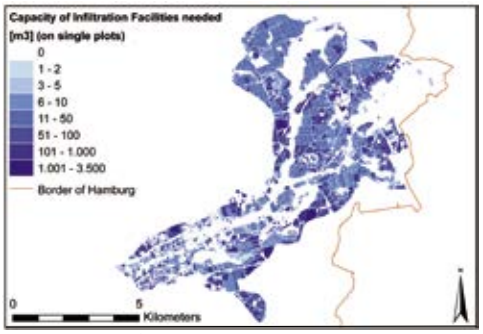
Hydrogeological prerequisites (hydraulic conductivity, groundwater level) and the proportion of superstructed and unsuperstructed area were determined on plot level making use of available GIS data sources.



A large amount of stormwater is stored in the infiltration facilities resulting in a considerable reduction of the associated run-off peak in the hydrograph.

Results

1. On most of the plots in the River Wandse catchment stormwater management using infiltration facilities appears to be feasible.
2. At least 50 % of the impervious surfaces draining through the stormwater canalisation into the Wandse can be managed on plot level.
3. The volume of the infiltration facilities needed would add up to 417.000 m3 (compared to about 350.000 m3 in existing flood retention basins).
4. Actual potential for change of stormwater management very likely to be higher (traffic areas as well as alternative measures of sustainable urban drainage are not regarded in this potential analysis).
5. Resulting reduction of flood peak run-off is estimated to reach a minimum of 10-20 % for severe events.
6. Changing storm water management has to be integrated in the renewal of urban infrastrucutre using instruments governing urban development.



Facilities to infiltrate stormwater could be realised on all plots coloured blue.

Partners

HCU HafenCity Universität Hamburg

Landesbetrieb Straßen, Brücken und Gewässer

Synergetic Flood Retention for the River Wandse

HafenCity University Hamburg (**3**/4)

Potentials of Secondary Floodplains Establishment

Focus of the investigation was to determine areas adjacent to the watercourses, where an establishment of a secondary floodplain is possible regarding topography and existing concurrent uses.

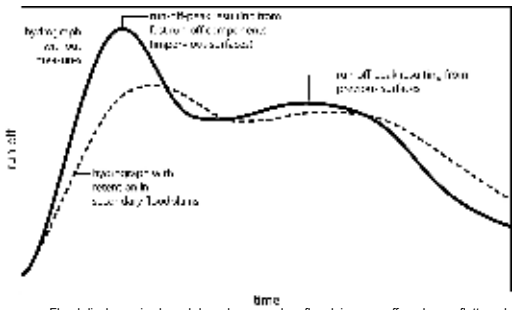
Apart from restoration of habitat structure and flood retention, secondary floodplains in urban areas should be designed regarding amenity values.

Approach

Checking topography, ownership, administrative responsibility, land-use, existing infrastructure and vegetation in a 40 meter corridor around the watercourses using GIS and site inspection.

Results

1. Establishment of secondary floodplains is limited along the smaller tributaries of the River Wandse, mostly because of private property.
2. Along the River Wandse main course and the Berner Au stream network (a major tributary) the establishment of secondary floodplains still seems feasible on 30 % of the adjacent areas.
3. If secondary floodplains could be realised as well structured core habitats in an extent mentioned above, it is very likely to notably ameliorate ecological potential of a large part of the watercourse network.
4. Because of small catchment size and low gradient flood retention in near-natural floodplains will be comparatively effective for the River Wandse stream network.
5. Resulting reduction of flood peak run-off is estimated to reach a minimum of 5-10 % for severe events.
6. Effectiveness of retention in near-natural floodplains even increases for stronger floods as a larger part of the run-off is stored and slowed down in the flood plains.
7. Acceptance of the establishment of near-natural floodplains is highly depen-dend on a development of the green corridors allowing for a high quality with regards to recreational purposes as well.



Flood discharge is slowed down by secondary flooplains, run-off peaks are flattened.

One result of the investigation is a map showing the areas in which the establishment of secondary floodplains appear to be feasible.

Partners

HCU HafenCity Universität Hamburg

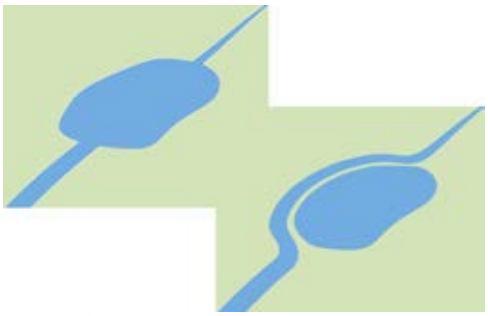
Landesbetrieb Straßen, Brücken und Gewässer

Synergetic Flood Retention for the River Wandse

HafenCity University Hamburg (**4**/4)

Potentials of Optimising Existing Ponded Sections

Focus of the investigation was to find the retention basins that are likely to be effective to cut the flood peaks of extreme events.



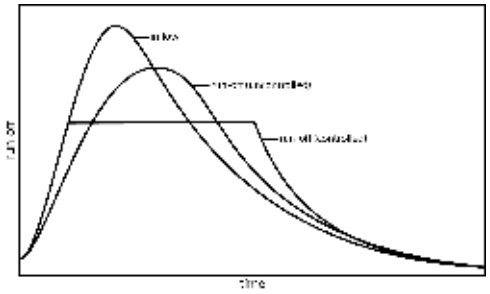
Optimising retention characteristics could go along with the restoration or improvement of aquatic animal passage and vice versa.

Approach

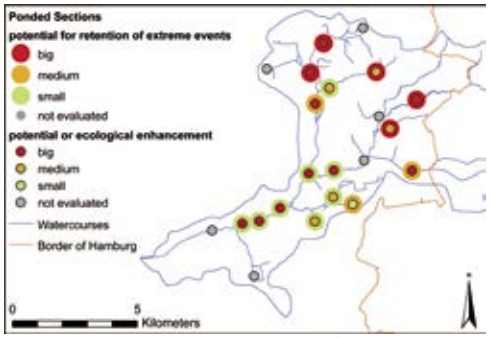
For a large number of different synthetic discharge hydrographs the discharge in the as-is-status and the optimal throttle values were calculated and compared (making use of the existing retention volumes of the basins).

Results

1. Optimisation of existing ponded sections with regards to better retention of extreme floods is more effective for the basins in the upper reaches and the tributaries than for those in the main course.
2. The potential for ecological enhancement is stronger for the basins of the River Wandse main course (due to high importance of aquatic animal passage in the investigation scheme).
3. If the discharge characteristic of a retention basin is changed to allow for optimised retention of extreme flood events, it has to be taken into account that peak run-off values of frequent events must not increase (avoid frequent hydraulic stress).
4. Resulting reduction of flood peak run-off is calculated to reach up to 30 % directly downstream of the basins.
5. Effectiveness in lower reaches has to be investigated using run-off-models to avoid undesired superposition of discharge waves from different subcatchments.
6. Further investigation of optimisation should regard bottlenecks downstream the basins as well.
7. Again, optimisation has to keep in mind the importance of the open spaces around the basins for recreational purposes.



The retention capacity of the basins can be used best, if run-off-peaks of extreme flood events are cut precisely at the amount of discharge that can be managed safely.



Basins in the upper reaches and in the tributaries were found to have the strongest potential for optimisation with regards to the retention of extreme floods.

Partners

HCU HafenCity Universität Hamburg

Landesbetrieb Straßen, Brücken und Gewässer

Measures - Green Roofs

Project Nor3 at NVE

Norwegian Water Resources and Energy Directorate

NVE

Main Idea

Roofs with vegetation cover can hinder precipitation becoming pluvial urban floods.

Figure 1. The left hand side sedum roof and the reference was compared

Approach

This poster shows how even shallow soil - 3 cm - green roof functioned under wet conditions. The runoff intensity under a rare, heavy precipitation episode in July 2009 (Fig. 2) was decreased by at least 26 % when the roof was initially dry.

Results

» The first nine mm was adsorbed into the green roof (Fig. 2).

» The green roof peak was delayed a few minutes.

» The runoff was distributed over longer time than the black roof.

The future climate change projections for Norway indicate a warmer climate and more incidents with heavy rain. This could mean a situation like in Figure 2; a dry roof receiving loads of water within a short period of time. Green roofs are a possible measure to reduce the inundation after heavy rain over urban areas.

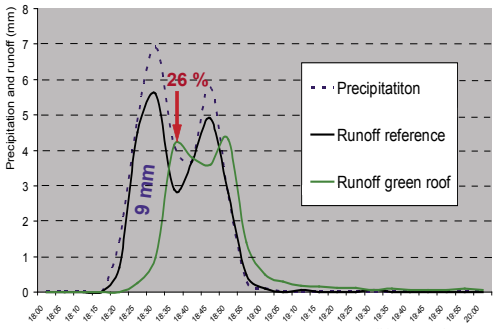


Figure 2. Precipitation (29 mm in 30 min.) and runoff from a roof with no vegetation (reference) and sedum vegetation, after one week of drought.

Contribution to SAWA

When making Flood Risk Management Plans (FRMP) the need of tested measures in the toolbox is essential. Green roof is a measure with great potential.

More about rain gardens: www.iwawaterwiki.com

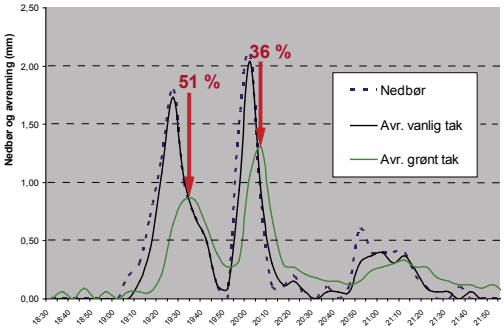


Figure 3. Wet green roofs also influence the runoff intensities. In late July the runoff peaked after 14 mm rainwater (in 2 hours) was decreased by 51 and 36 %

By Bent C. Braskerud

Measures - Rain Gardens

Project Nor3 at NVE, Norway

Norwegian Water Resources and Energy Directorate

Main Idea

Rain gardens are shallow depressions in the soil that receive runoff after rain. Stormwater enters, is held back and infiltrates the ground. In this way the water quality is improved and the ground water is recharged. Rain gardens are often covered with flowers, bushes or other types of vegetation that enjoy wet and dry conditions. This is a great opportunity to get interesting species into the garden or the urban centre.

Approach

In the SAWA project four rain gardens have been built and are under testing: Three small for single houses (3-7 m^2) and one larger (40 m^2) for several houses and a play ground (photos 1, 2 and 3). The results for a 7 m^2 rain garden (photo 1) are presented here as an ongoing master thesis project of Kjetil Kihlgren and Vegard Saksæther (UMB). Two episodes with 50 yr rain frequency in Oslo were reconstructed by entring water from a tank. The rain garden covers seven percent of the house roof area (100 m^2). The main idea with rain gardens is to retain local stormwater.

Rain garden under testing in Oslo

Testing infiltration intensity in rain garden in Melhus

Large rain garden in Trondheim

Results

First run: 30 mm in 30 minutes did not overtop the rain garden. Max. input was 121 l/min, which equals 202 l/s ha catchment. Max. runoff from the drainage system was 80 % less.

Second run: 16.5 mm in ten minutes did not overtop the rain garden either. We continued to enter water at the same intensity (184 l/min or 302 l/s ha), until the rain garden was overtopped after approx. 17 minutes. The runoff peak was reduced with 84 %.

A rain garden has the ability to store and reduce high rain intensities. For several areas the catchment (e.g., house roof) – rain garden ratio may be less than 7 %, depending on the soil texture in the rain garden. In clay soils exchange of soil and drainage may be necessary to keep the size small.

Contribution to SAWA

When making Flood Risk Management Plans (FRMP) the need of tested measures in the toolbox is essential. Rain gardens are a measure with a great potential; they handle the urban stormwater, they can be retrofitted and improves the local environment in a blue-green direction. A real win – win solution.

More about rain gardens: www.iwawaterwiki.com

Co-partners

By Bent C. Braskerud

Capacity Building Activities

Sustainable Education Center on Life Below Sea

Waterboard of Delfland, The Netherlands

Main Idea

The Dutch general public are less and less aware of what the water boards need to do to keep our low country safe and dry. This could lead to too little water experts in the nearby future and a lack of basis for the activities of the water boards.

Pumping water from one level to another by operating the jack

Approach

» To add an exhibit on the subject to the Delfland educational programm.

Artist impression of the SEC

Results

» A manual on how an SEC on this subject would best meet the educational aims

» A mobile, interactive SEC on the way Delfland keeps the lower parts of its area dry by pumping water from the polders, to the main canals, and pumping it from the main canals out to sea or Nieuwe Waterweg

» The exhibit has been on display at several occasions.

SEC on display at the opening of the new technical campus of the Rotterdam University

Contribution to SAWA

» WP3 conference in Delft in 2009.

» Participation in discussions on how to share experiences and knowledge

» Presentation on the SAWA conference of 2010

» Presentation to several international delegations and to student groups.

SAWA co-worker:
Thecla den Hoedt

Co-Partner

DykeDefenceClass – SEC Hamburg

Agency of Roads, Bridges and Waters (LSBG), Germany

Landesbetrieb
Straßen, Brücken
und Gewässer

Main Idea

Today, many local societies exist in floodplains, i.e. originally amphibious areas, without a socio-cultural relation to this quality of their living environment – the source of the known difficulties. In the times, when every inhabitant fo such an area had the obligation to participate in dyking, very specific local cultures evolved, introducing a notion of this local quality into every aspect of local life, influencing behaviour and rules – without establishing permanent fears. The DykeDefenceClass aims towards such an “amphibious society”.

Approach

School classes accomplish phases of interdisciplinary project work in the fields of dyking and dyke defence, attended by selected experts.
Integrated disciplines shall comprise language, geography and history, science and social sciences: self conducted in-School experiments – e.g. with a ”DykingCrate“, exploration of the pupils living environment, “real life” experiments in natural settings and finally a competition for the best dyke defence, carried out on the premises of the training centre for dyke safety. Optional: accompanying artistic project work.

Results

An 8th grade class of a comprehensive school in Hamburg-Wilhelmsburg has completed a first conceptual and abbreviated program. A brief introduction to the topic in class was followed by a self-staged dyke-breach-in-a-box experiment in class (DykingCrate) and the competition for the best dyke defence. The respective class has chosen dykes & storm surges as a central subject over the coming three years. At the end, the pupils intent to share their experience and knowledge, storm-surge-scouts in the favour of an adopted culture. Presently, they are very much at the beginning of this journey. This first cycle conducted brought forward two aspects: the things done and experienced in short had a strong impact and the sketched project phase and intended results surely require a broad and in-depth approach, rather expanded over a longer period of time to permit encounter and re-encounter, experience and recovery towards familiarity.

For the future...

It is intended to reserve an annual budget for a certain number of classes to conduct the project phase. Respective teaching material will be designed, produced and and provided for each project class: preparative and teaching material for teachers and accompanying material for pupils (The DykingBook). Further information: Jeff Marengwa, LSBG

Contribution to SAWA

The idea evolved from the theoretical approaches to “Capacity building”, developed within SAWA, thus presenting one exemplary implementation of these approaches.

Exhibition - The City is Full of Water

SAWA Sweden

Main Idea

» Spread knowledge to local people, especially school children, about the work with developing a flood risk management plan for the municipality of Lidköping.
» Inform about the opportunities given by an international EU-program to financially support such an initiative by helping create a network of national and international experts on flooding to help achieving the work.

Approach

A SAWA exhibition was developed in co-operation between the County Administrative Boards of Västra Götaland and Värmland and Vänermuseet – the Lake Vänern Museum of Natural and Cultural History in Lidköping.

Its theme was the effect of climate change on Lake Vänern and its floods. How will the urban areas bordering the lake be affected when the water level rises and how do you prepare for higher water levels? Illustrated by facts, a video, figures and a series of suggestive scenes, the exhibition also showed historical events, among them the winter flooding of 2000/2001. School children were engaged in discussing how best to solve the flooding problem, where to build houses etc.

The exhibition, named Stan é full av vatten! - Plentiful of water in the town!, was on display between 4 April and 23 May 2010. It was then restyled to a mobile exhibition and went on display at the Public Library of Karlstad and at other municipalities bordering the lake.

On 14 April, representatives of the Swedish SAWA partners, the Municipality of Lidköping and the Museum held a seminar for upper secondary school pupils and their teachers about SAWA, climate change and the challenges ahead for Lake Vänern. Around 70 persons from three schools participated.

Results

It has been estimated that more than 100.000 persons have visited the exhibitions. School children have been informed about the local flooding issues and how to deal with them as well as about SAWA its co-operation network. The seminar and the activities at the exhibition gave them the opportunity to exchange points of view on climate change and flooding in the Lake Vänern area and discuss with experts and municipal planners. An interesting result is that young school kids after discussing flooding problems around lake Vänern during half a day suggest more or less the same safety measures as ”the experts” that professionally work i the field.

SAWA Sweden co-workers: Susanna Hogdin, Phil Graham, Johan Mannheimer & Lars Nyberg

Contribution to SAWA

» Contribute to building up knowledge about climate change and flooding
» Spread knowledge about EU-programs and what they can help achieve.

Co-partners

Länsstyrelsen Värmland

LÄNSSTYRELSEN VÄSTRA GÖTALANDS LÄN

Flood Walk in Karlstad – Raising the Local Flood Risk Awareness

Karlstad University - Centre for Climate and Safety, Sweden

Main Idea

To raise the awareness of flood risks in Karlstad, Sweden, a flood walk has been developed by the Centre for Climate and Safety. Groups of people are guided on a walking tour to learn and reflect about flood hazards from river or lake floodings or from intense rainfall. A discussion among the participants is encouraged to create a walking seminar.

Map of Flood walk in Karlstad with all 14 stops. Normally 5-6 stops are used during one walk.

Approach

The city of Karlstad is flood prone with its location on a big delta, on the shore of Lake Vänern. At the same time the municipality is active to reduce flood risks. During 90 minutes, groups of participants are guided along a 3 km long walk with about six stops. Each stop has a certain theme, for example about flood hazard characteristics regarding the River Klarälven or the Lake Vänern, historical floods or about vulnerabilities such as the function of the regional hospital or electricity or sewage systems. Alternative city planning and risk-reducing measures are also included.

The Flood Walk concept was created with the aims of providing a more participatory and on-site approach of flood related learning. The concept includes a study material to guide through the entire tour. The material is free to use in education or as guiding material, and can be found on our website.

Link to further information www.kau.se/ccs

Flood walk with a delegation from Schlesien, Poland in May 2011

Results

By November 2011 about 15 groups have been guided. It has been students, representatives from the public, from regional and national authorities and visiting European and international flood experts. The group size has varied between 10 and 50 persons.

Contribution to SAWA

The Flood Walk has been developed as a part of the SAWA-project. SAWA is an EU-project with 22 partners from 5 countries spread around the Northsea. The project goal is to develop common strategies for implementation of the EU Flood directive.

Flood walk where the public in Karlstad was invited, Aug 2011.

Partners

Länsstyrelsen Värmland

CITY OF KARLSTAD

Floodville - an Interactive Model of a Flooded City

Karlstad University - Centre for Climate and Safety, Sweden

Raising Awareness by Interactivity

The idea behind the flood model "Floodville" is to raise awareness about flood related problems by seeing, feeling and experiencing the consequences of rising water levels. A physical model serves as a tool for learning and as an inspiration for discussions. It can be used in different target groups both in terms of age and knowledge level. A competition concept adds a motivational factor that can make the context more exciting and thus facilitate learning. Floodville is a simplified model of Karlstad.

The model was developed for the event Researchers night in Karlstad and was used for competitions between classes (age 12-18). The model has also been used to start a discussion in a group of experts.

The model can be flooded (water is pumped into the model) to illustrate the scenarios in case of a flood. The impact of a flood is measured by sensors placed near critical functions in the model, such as the hospital, waste water treatment plant, emergency services and communications. These sensors are connected to a computer and the results of a flood event are summarized and displayed on a monitor.

The model: Floodville

Execution of the Competition

The competition follows a flood cycle. It starts with a warning, followed by prevention, management of the acute phase and finally the evaluation of the operation. The flood protection measures are symbolized by modeling clay.

The challenge is to select, given the limited amount of resources (clay), what critical functions that must be protected. Some consequences of a flood can be prevented by placement of flood protection measures at strategic places in the model. When the flood event is over its consequences are summarized and displayed on the screen. Scores are earned based on how well critical functions were protected and the computer software simulates economical consequences as well as the number of affected people; homeless, injured/ill, seriously injured and dead.

Karlstad University staff, with help from the model developer - Johan Rosén - explaining how Floovile works

Link to further information www.kau.se/ccs

Contribution to SAWA

Floodville is developed by the Center for climate and safety as part of the SAWA project, WP3 with the aim of raising awareness of climate change and water management issues. The model will also be used as a tool for learning at our Sustainable Education Centre, both for school children, stakeholders and experts.

The project was conducted in collaboration with the museum of Värmland. In addition to EU Interreg North Sea Region Programme the project was cofinanced by grants from the County Administrative Board of Värmland and the Swedish Civil Contingencies Agency (MSB).

Competitors in action

Partners

Karlstads Universitet

Värmlands Museum

MSB Myndigheten för samhällsskydd och beredskap

Länsstyrelsen Värmland

Where to find further information? –The Linkage

Links

» *http://northsearegion.eu/*

» http://www.sawa-project.eu/

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