

# **Report SedNet conference on 7-9 October 2009, Hamburg, Germany “The Role of Sediments in Coastal Management”**

## **Session “Report and Key-note presentations”**

The conference was opened by Axel Netzband, Chairman of SedNet, and Jens Meier, managing director of the Hamburg Port Authority as co-organiser of the conference. It was followed by a report from the SedNet Round Table Discussion “Implementation of sediment management issues into the first RBM Plans”, given by Piet den Besten, SedNet Steering Group.

The title of the presentation of Francois Kremer, European Commission / DG Environment was “Natura 2000 and estuaries”. Estuaries and coastal zones are among the most productive ecosystems of the world, with both high ecological and economic values. As Natura 2000 sites they are subject to the protection regimes under the 'Habitats Directive (92/43/EEC) and/or the 'Wild Birds Directive' (79/409/EEC). Inevitably there will be occasions where port and waterways developments and Natura 2000 conservation objectives collide. The directives lay down procedures for ensuring that such developments are done in a sustainable way that is compatible with the conservation of species and natural habitats for which the Natura 2000 sites have been designated.

Since now more than two years the European Commission has been working with stakeholder organisations and environmental NGOs with a view to developing guidelines and recommendations on the implementation of the EU nature legislation in estuaries and coastal zones and for avoiding conflicts between Natura 2000 objectives and economic development needs. Human activities in estuaries include ports & navigation, dredging, sand mining, fisheries, industry, wind farms, flood protection, recreation, urbanism, etc.

Mr. Kremer acknowledged the concept of 'Working with nature' of PIANC, the World Association for Water borne Transport Infrastructure. The concept has a focus on achieving project objectives in an ecosystem context rather than assessing consequences of a pre-defined design (-> integrated management) and on identifying win-win solutions rather than simply minimising ecological harm (-> partnership).

So the title of the next presentation “Building with nature” of Martin Scholten, IMARES, The Netherlands, fit perfectly well. EcoShape is a Dutch National Innovation Programme for the time period 2008-2012, partners are from both science, industry, and administration. The main objectives are to develop scientifically sound design rules and norms enabling ‘building with nature’ using practical examples.

Mr. Scholten reported about a shift towards an ecosystem based approach: Ecodesign based on the natural dynamics. It means a turn around from a defensive approach to minimize environmental impacts to an offensive approach in order to optimize full economic and ecologic potential. This means to design a project on the basis of understanding the ecosystem dynamics and functioning as well as on the understanding of ambitions, opinions, concerns and discourse amongst stakeholders in the social system.

A project should be planned in coherence with other functions, such as coastal defence, aquaculture, sand and gravel extraction, land reclamation, nature development or restoration, etc. In the planning it should be determined how natural processes can be used and stimulated to achieve the goals. Project execution should give room for adaptation of the project.

## **Session “Conceptual approaches”**

The SedNet Roundtable that preceded the Conference recognized the need of developing conceptual models of sediment fluxes and contaminant transport to provide a better understanding of the system. In this respect the session on conceptual approaches provided a good overview of actions taken in Canada and UK to create a basis for sustainable sediment management.

Suzan Roe presented the assessment and management framework of sediments in Canadian waters, which is currently under development by the Canadian federal government in cooperation with provincial governments. The aim is to incorporate into the framework the

elements of existing assessment and management tools. Within the framework, sediment quality guidelines may be adjusted to account for intended use (i.e., in cases of pollution prevention, a high level of protection is desired while for remediation of contaminated sites, a clean-up target that will help restore ecological function is required).

Kevin Black informed on a management framework that will provide stakeholders in UK with guidelines for the management of contaminated marine sediments in UK waters. The framework will collect information on all relevant data, liability issues, impacts of legislation, pollution prevention methods, contaminated sediments disposal options and future research areas. The implementation of the framework in the UK ports and harbours will reflect the principles of sustainable environmental management.

Sediment risk ranking and management framework and tool development and evaluation was presented by Susan Casper. Adapting DPSIR-based sediment models developed for a number of catchments and a sediment-specific adaptation of the relative risk model, a generic framework is under development in UK to support decision-making in deriving a catchment sediment management plan. This includes evaluation of measures for reducing risk to catchment management objectives in support of the WFD.

Sabine Apitz discussed different aspects of building a decision framework for management of a dredged material in light of a specific scientific and political situation. Various factors influencing the decision framework performance such as chemical action levels, selection of biotests, combination of data and tests and reference conditions changes were addressed.

### **SedNet conference 2009: Session “Management and Policy”**

The session on Management and Policy began with a keynote of Beate Ratter (University of Hamburg / GKSS, Germany) on people’s perception of natural hazards. Beate Ratter concentrated on coastal geohazards and here especially on the storm surge that hit Hamburg in 1962. For a hundred years (1855–1962) there had not been an extreme flood event. Subsequently, people were little aware of that risk, and the city was unprepared to fight the water and to protect its people. Since today, the flood of 1962 is well imprinted on people’s minds even though there have been higher water levels since then which – due to higher dikes – did not do much damage. Only recently, an extensive new urban area, the “HafenCity” (harbour city) has been allowed to be built in the Hamburg port area – at the water front.

The keynote was followed by a presentation of Amy Oen (NGI, Norway) which continued along the line of public risk perception. Giving details on a controversial sediment management disposal site in Oslo harbour, Amy demonstrated the importance of including the public and addressing its perception in making decisions on sediment management options. Conclusions have been drawn from the challenges, that the process in Oslo had to face, and consequences for coming remediation projects in e.g. Bergen include the establishment of a stakeholder panel early in the process and transparent multicriteria decision making to identify potential remediation alternatives. (Presentation: “Sediment and Society: assessing approaches for including stakeholder interests and contaminated sediment management”).

The next talk by Andrea Barbanti (Thetis SpA, Italy) also demonstrated experiences and lessons learned from former activities, in this case sediment management in the Venice lagoon (“The sediment management issue in the Venice lagoon: lessons learned and future perspectives”). Andrea focussed in his talk on the challenge to connect science and policy making with the final goal of having scientifically sound management solutions. His major criticism being that the technical protocol used for assessing dredged material is outdated and should have been revised for quite some time. He gave conceptual, technical, and administrative recommendations on what to change but clarified the present limitations and difficulties. He concluded that more sustainable and holistic approaches with an updated scientific base would be needed in order to come up with an improved sediment management concept that would help to preserve and restore coastal ecosystems such as the Venice lagoon in future.

Jos Brils (Deltares, the Netherlands) ended this session describing “The EU environmental policy shift towards sustaining of ecosystem services and its possible implications for sediment management”. Jos demonstrated the shift from conservation of single species in the 1970s to preservation of ecosystem services which we know today to be – together with the protection of biodiversity - the core of EU environmental policy. He stated that so far

application of the underlying concepts has been scarce – especially for sediment management issues. Often the matrices sediment, soil and water all contribute to specific ecosystem services complicating the issue. A way forward would be to carry out a comparative analysis of projects and real world cases concerned with these topics in order to extract from there a practical guidance to facilitate implementation of the EU environmental policies.

### **Session “Risk and Monitoring”**

The session started with a presentation of Oscar van Dam focusing on hydro morphological challenges in the WFD and the link to sediments. Both quantity and quality of sediments are closely interfering with hydro morphological conditions and thus with the ecological potential of a water body. Sediments are an essential part of hydro morphological monitoring but the way that it is included differs a lot and should be improved if the data needs to support the implementation and evaluation of a program of measures. Typical measures, which are clearly linked to sediment as part of the hydromorphology, are dredging activities and the creation of new habitats by sand suppletion.

Monitoring the ecotoxicological risk of sediments is not incorporated in the WFD, but several other international guidelines focusing on dredged material emphasise the importance of ecotoxicological testing of the sediments in addition to chemical, physical and biological characterization as was shown by Carolin Floeter. However the results of the ecotoxicological sediment assessment in the Port of Hamburg that was carried so far was linked with high uncertainty. The results showed high variability and the classification itself was based on the result of the most sensitive test, irrespective of the results of the other tests. Therefore a new concept is under construction in which the ecotoxicological risk assessment is better harmonised and validated.

Birgit Schubert gave an overview of chemical monitoring of sediments and suspended solids in estuarine environments in Germany. This monitoring is mainly carried out in function of dredging activities and to study the transport of fine particulate matter. The results showed clearly that sediment quality is improving in the estuary in downstream direction, but also that recently deposited sediments are containing lower concentrations of metals such as cadmium. This can be explained by an increased upstream transport of marine particulate matter into the estuary but also due to the fact that the suspended solids coming from upstream river basins are less contaminated.

Transport of contaminated sediments was also the focus of the presentation of Jos Van Gils. It was shown that due to the mixing of cleaner marine suspended solids with contaminated freshwater suspended solids in the estuarine environments, net fluxes of contaminants to the North Sea are overestimated if these take not into account this mixing. It was shown also that achieving the Water Quality Objectives (WQO) for priority pollutants in coastal waters in 2015 or even 2027 can only be successful when the transport of contaminated suspended solids and the exchange of contaminants between water, suspended solids and the sediment is considered. This was clearly shown by the timeframe that TBT concentrations are exceeding the WQO in the years after 2008 when the application of TBT containing antifouling paints is. Exceedence will occur much longer due to the interaction between the water and the sediment.

### **Session “Sediment Management”**

This session comprised of four talks. It started with a key-note presentation given by Giovanni Cecconi who considered the role of sediments as a fundamental resource in coastal areas, especially in systems affected by sea level rise and erosion. Based on the results of works conducted in the Venice lagoon during more than twenty years he demonstrated that wind, wave and tide driven sediments can settle and be stabilized by stimulating natural processes creating a variety of structuring and self-preserving habitats, such as beaches, dunes, salt marshes, eel-grass prairies, and inter-tidal flats. The second presentation by Yves M.G. Plancke focussed on the morphological management of the Western Scheldt. The concept developed by an expert team from the Antwerp Port Authority aims both at improving the morphological status of the estuary and at reducing the quantity of dredged material. Since 2002 the new strategy is being investigated a pilot project on the Walsoorden sandbar. The present results are promising both in terms of economy and ecology. The following

presentation was given by Gunnel Göransson. She emphasised the role of extreme events, partly caused by climate changes, and their impact on the risk for mass failure. How prepared are we to meet such events? Based on the climate change scenarios for the Swedish west coast, calculations clearly indicate an increase in the risk for mass failure of sediment. Possible hydraulic effects as well as effects to the water quality have to be considered, which in term may have consequences for a variety of uses. Tools are needed to manage such events of low frequency but high magnitude. In his last presentation, Renaat de Sutter dealt with climate change and socio-economic impacts on the long-term sediment balance in the Belgian part of the North Sea. Preliminary results of two ongoing projects were presented. The one project aims at differentiating the anthropogenic climate change effects from the natural evolution at the North Sea scale. The other focuses on sedimentation/erosion processes on different scales both in terms of geography and time.

### **Session “Sediment Balance and Transport”**

This session comprised of 3 presentations.

The first presentation by Jens Laugesen dealt with the use of tracer particles as a new technique to monitor and quantify transport of contaminated sediments. This was tested in two studies in Norway. These studies show that it is a promising technology. The method needs however a large amount of sediment samples which have to be analysed for tracer particles to be able to give good results. A further refinement of the technology is necessary. The second presentation by Sabine Gerbersdorf focussed on biological engineering and its consequences for sediment stability and floc entrainment and transport. The study shows that bacterial assemblages cannot be neglected when considering microbial sediment stabilization and secondly, that a change in abiotic conditions can affect their stabilization potential significantly. This is of particular importance when considering the expected changes due to climate change in the future. Next to this the characteristics of the eroded flocs have shown distinct patterns depending on the biological origin, with severe consequences to sediment transport and –deposition.

The last presentation by Benjamin Dewals showed a modelling system, handling the wide range of time scales involved in sediment transport processes. It described a modelling system dedicated to depth-averaged simulations of flow and sediment transport, as support for sustainable management of sediments. As a result of the flexibility offered in the levels of coupling between flow and sediment transport models, stable and accurate numerical solutions are obtained for predictions of erosion and sedimentation patterns in the short, medium or long term, considering both bed load and suspended load.

### **Special Session “Managing the Elbe Estuary”**

In a Special Session “Managing the Elbe Estuary” on Friday, 9<sup>th</sup> October 2009, participants of the SedNet conference were invited to learn about the tidal Elbe and its environmental and economic importance for the port of Hamburg. Comprehensive maintenance operation for a safe navigation and environmental protection of the sensitive natural habitats along the 100km long tidal Elbe is a challenging task for all involved stakeholders. The related management concepts and their diverse aspects were the key issues of this special session which was attended by 75 participants.

Heinz Glindemann from Hamburg Port Authority held an illustrative introductory speech on challenges and visions affiliated with the Elbe estuary from a user’s perspective. Hydrodynamic changes during the past decades claim permanent attention to the Elbe estuary and the port of Hamburg, especially in terms of water level and sediment management. As part of his speech Heinz Glindemann introduced the “Tideelbe” concept which combines the elements (1) attenuation of the tidal energy through river engineering, (2) implementation of more tidal volume and (3) an optimized sediment management of the river. New measures such as the pilot project “Spadenlander Busch” were presented to demonstrate the possibility for improving the hydrological situation of the river Elbe through new tidal areas within the city of Hamburg ([www.tideelbe.de](http://www.tideelbe.de)).

The following presentation by Harro Heier from the Federal Waterways Engineering and Research Institute (BAW) articulated the need for tools to improve the predictability of river basin processes and sediment management strategies, especially under consideration of future tasks such as the sealevel rise because of climate change. Due to Harro Heyer this

could be achieved through the analysis of more tidal parameters on the basis of mathematical model results.

An overview on the Natura 2000 management plan for the Elbe estuary was given by Elisabeth Klocke, Ministry for Urban Development and Environment, Hamburg.

The crucial issue of sediment management within the area of Hamburg and its harbor was shown in respect of relating environmental issues. An integrated concept including the steady adjustment of the relocation strategy and monitoring scheme in reconciliation with environmental administrations and NGOs was suggested.

Sediment management measures in the port of Hamburg were presented by Claudia Flecken, head of the division Port Infrastructure, Hamburg Port Authority. The presentation clarified, that dredging operation is a key element for guaranteeing safe navigation in the port of Hamburg. Hamburg Port Authority implemented a land treatment concept which includes operation of the METHA, the largest treatment plant for dredged material worldwide.

Finally participants of the Elbe Session were given the opportunity to visit the METHA plant and the Francop land disposal site for sediments. The fieldtrip was accompanied by presentations of Heinz-Dieter Detzner (Overview), Ulrich Döring (METHA) and Hubert Urich (Francop land treatment).