



West Africa Coastal Areas (WACA) Program

Detailed Proposal

WORLD BANK

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1 Summary

NIRAS has prepared an innovative idea and a well-defined programme with a clear purpose of elaborating Shoreline Management Planning (SMP) Guidelines for each member state engaging all key stakeholders in a participatory SMP process.

NIRAS' role is to facilitate the process of networking and knowledge sharing and present feedbacks supporting the preparation of SMP Guidelines specifically designed to each WACA member state.

The innovative idea build on a believe that:

the key obstacles in designing sustainable ports are deficient planning of the coastal zones due to lack of knowledge and understanding of the physical and ecological environment in the coastal areas, rather than lack of specific expertise and knowhow in port and lagoon design and operation.

We strongly believe that SMP is a power tool to meet above challenges.

We have chosen to focus on **Thematic Challenge 2: Information on proposed planning measures and port and lagoon operation management practices.**

We acknowledge that many WACA countries are studying the morphology of the coast along their shores and are carrying out a number of Climate Vulnerability and Risk Assessment (CVRA). We believe that the results of these studies can be used as very valuable baseline information for elaborating a **Shoreline Management Plan** (SMP).

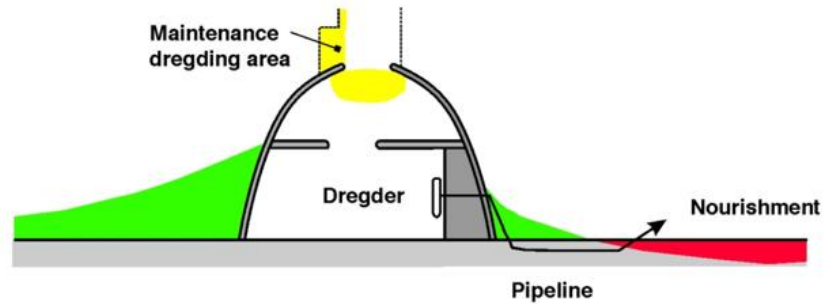
Our **innovative idea** concentrates on initiating a SMP process in each of the Member states resulting in elaborating a country specific **SMP Guidelines** for each country.

With a proper SMP Guideline the country will be well prepared to continue the elaboration of SMP for each of the coastal cells defined in the Guideline using the methodology and approached specified in the SMP Guideline.

2 Introduction

The challenges of building harbours at the sandy coastline with considerable littoral transport have been detailed studied in "Shoreline Management Guidelines" DHI 2017 and in a number of the scientific articles so as "Bypass Harbours at littoral transport coasts" presented at PIANC MMX Congress in Liverpool UK 2010.

Figure 2.1: The principle of maintenance and dredging and artificial bypass arrangements for a small port at a littoral transport coastline. Source: "Shoreline Management Guidelines" DHI 2017



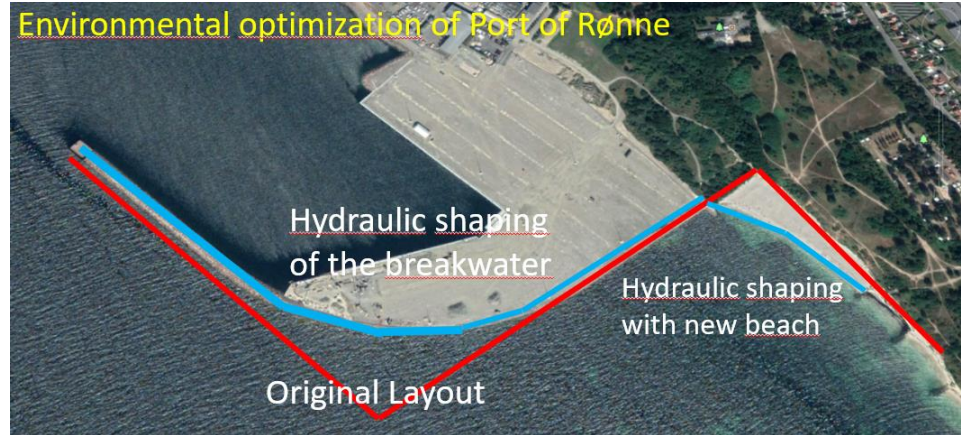
Various solutions have been discussed in "Bypass Harbours at littoral transport coasts" and designed proposed. **Thus, we believe that the expertise for designing sustainable ports is available today.**

In the design of new port the sedimentation issue is usually only focusing on minimizing the costs for maintenance dredging and the downstream erosion is less addressed.

Figure 2.2: Example of design of breakwaters and downstream protection with detached breakwater. Left: Before adjusting breakwaters; Right: new alignment based on hydraulic modelling. Source: "Shoreline Management Guidelines" DHI 2017



Figure 2.3: Example of environmental optimization of Roenne Port to minimize negative downstream impacts.



However, deep focus on the technical challenges combined with general awareness raising have led to sustainable design of several new ports reducing negative environmental impacts. The design has been based on a deep understanding of the coastal morphological processes. Such understanding will be achieved with the implementation of shoreline management planning (SMP).

Port planning usually covers periods of several decades subject to climate changes. Therefore, our innovative concentrates on initiating a SMP process in each of the Member states taken into account the climate changes.

We choose to focus on **Thematic Challenge 2: Information on proposed planning measures and port and lagoon operation management practices.**

We believe that WACA can gain great value from our state of the art expertise within this specific area.

We acknowledge that many WACA countries are studying the morphology of the coast along their shores and are carrying out a number of Climate Vulnerability and Risk Assessment (CVRA). We believe that the results of these studies can be used as very valuable baseline studies for elaborating a **Shoreline Management Plan (SMP)**.

SHORELINE MANAGEMENT PLANNING is defined as a process of governance that consists of the legal and institutional framework necessary to ensure that development and management plans for SMP Zones are integrated with environmental and social goals and are made with the participation of those affected and/or with a specific interest (e.g. central planning authorities, local authorities, local community, land owners and developers).

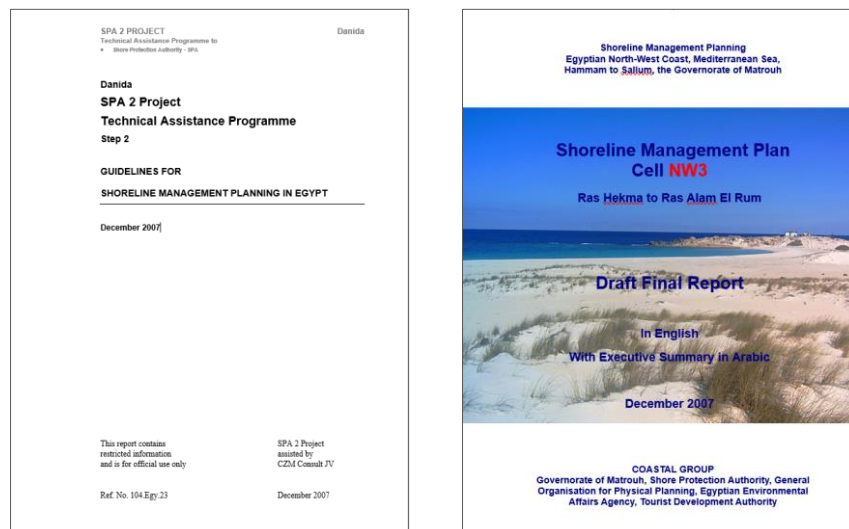
The result of a shoreline management planning process is a SMP document which sets long-term objectives for a specific SMP Zone; in order for the SMP to be a practical and applicable document, it is essential that the preferred policies are based on realistic long-term objectives and can be justified once implementation of the policies is realised. This implies that the SMP must remain flexible enough to adapt to changes in legislation, politics or social attitudes not foreseen during the preparation of the SMP.

With a solid SMP in place the countries will be ready for further planning of all activities on the coast including coastal port and lagoon operation management practices.

THE PROPOSED INNOVATIVE IDEA. The overall concept idea is to initiate and share the elaboration and implementation of Shoreline Management Planning (SMP) in each of the WACA countries. NIRAS recommend WACA to initiate a Forum for coordination among the various funding agencies and countries for further elaboration of the need of the SMP. NIRAS believe that SMP will result in a solid basis for achieving long term-sustainable development of the coastal zone meeting the UN's SDG, including layout and design of ports and master plans.

The outcome of the programme will be a country specific **SMP Guideline** elaborated for each member state adjusted to the needs defined during the execution of the programme. The SMP Guideline will be based on an overall risk and vulnerability assessment built on existing studies and will include a division of the coast into management cells and detailed guidelines for elaboration of a Shoreline management Plan for each cell.

Figure 2.4: NIRAS has extensive experience with preparing SMP Guidelines from amongst others SMP Guidelines and SMP for a two 80 km long coastal cells along the Egyptian Mediterranean coastline.



THE TEAM BEHIND is a key to a successful facilitation of the process and practical outcome of the Program. Our world class experts will make sure that the objectives are met, the network is established and WACA receives the tool for further work with shoreline management. The team is further presented in Section 4.

3 The context of SMP

The overall objectives of the SMP include the following activities:

1. To establish stakeholder forums/groups in order to share information, to coordinate planning and to gain consensus for the preferred policies
2. To define, in general terms, the vulnerability and risks to people and the developed, natural and historical environment within the SMP Zone of the target area over the next 100 years
3. To identify the preferred policies for managing the shoreline risks and to identify the consequences of implementing the preferred policies
4. To set out economic and socio-economic procedures for monitoring the effectiveness of the preferred policies
5. To improve the information base by accessing information held by other stakeholders, including regional/local planning authorities, NGOs, the private sector and local community
6. To resolve conflicts of interest between different stakeholders through early and open discussion, regular meetings, working groups, seminars and workshops through clear and transparent procedures
7. To inform other relevant parties through information dissemination, e.g. public hearings, so that future land use and development of the shore can take due account of the risks and preferred policies.

In order to achieve the objectives, stakeholders should be engaged early in the process and be encouraged to participate in a two-way process of dialogue.

To support the SMP process in each of the member states the programme encompasses the elaboration of a **SMP guideline** addressing issues of special importance for each of the member states.

This cannot be done without the involvement of the key stakeholders in each country in a participatory process securing exchange of SMP information. To assist this process an informal **SMP team** should be appointed in each country responsible for providing and sharing SMP information and drafting up the SMP Guidelines assisted by NIRAS. The SMP team should be a cross ministerial group appointed among the various Ministries, institutions and organisations responsible for the physical and environmental planning and implementation in the coastal area.

It is the responsibility of the SMP Team to develop the stakeholder engagement model applied to the shoreline management planning based on participatory approaches assisted by NIRAS.

An important part of the SMP is access to all relevant data. NIRAS will advise in the establishment of cloud based GIS web data bases in each country, constituting the backbone of the SMP.





NIRAS role will be:

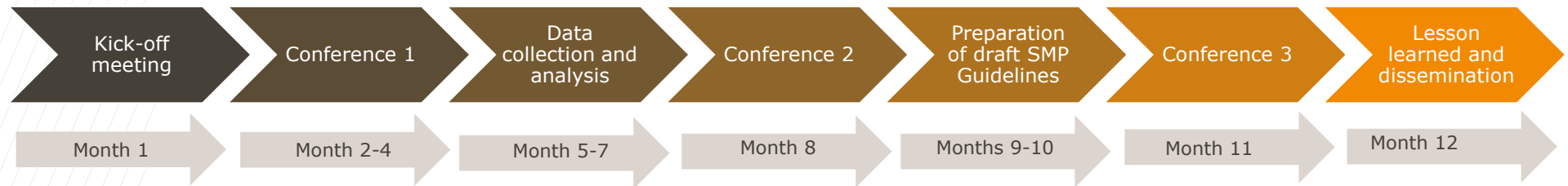
- To support establishing web data bases for storing data of relevance for SMP
- To support the establishment of local SMP team being overall responsible for the process of developing a SMP Guidelines
- To present technical SMP input of generic and specific relevance for the SMP planning in each country,
- To engage and assist the SMP team in each country with technical input,
- To assist in engaging the stakeholders in the SMP process

- To assist in the collection of the information and the analysis needed for drafting up a SMP guideline for further elaboration among the members states
- To finally assist in preparing the final draft SMP guideline developed to specifically addressing the challenges of port and lagoon design and operation in each member state.

4 Programme

Based on NIRAS' extensive global experience with shoreline management, we suggest the following one year long programme:

			
Kick-off meeting	Month 1	<ul style="list-style-type: none"> • WACA countries • Financing agencies • NIRAS 	Overall introduction of the program and process. Agree on expectations to the outcome. Final tuning of the scope and the process of implementation.
Conference 1	Month 2-4	<ul style="list-style-type: none"> • WACA countries' ministries responsible for shore line management and ports planning • NIRAS 	Establish SMP Team in each member state. Sharing of experience and networking. Inspirational SMP presentation by NIRAS. Action plan for data collection and analysis to be performed by the SMP group
Data collection and analysis	Month 5-7	<ul style="list-style-type: none"> • SMP Team • NIRAS 	SMP Team collects data and perform analysis assisted by input from NIRAS at a number of technical sessions prepared individually for each SMP Team.
Conference 2	Month 8	<ul style="list-style-type: none"> • SMP Team • NIRAS 	Sharing results of SMP analysis of experience with all member states. Prepare action plan for elaboration of draft SMP guidelines.
Preparation of draft SMP Guideline	Months 9-10	<ul style="list-style-type: none"> • SMP Team • WACA countries' ministries responsible for shore line management and port planning • NIRAS 	SMP Team prepare draft SMP Guidelines with all member states assisted by input from key stakeholders and NIRAS at a number of technical sessions prepared individually for each SMP Team.
Conference 3	Month 11	<ul style="list-style-type: none"> • SMP Team • WACA countries • Financing agencies • NIRAS 	Sharing draft SMP Guidelines with all member states.
Lesson learned and dissemination	Months 12	<ul style="list-style-type: none"> • NIRAS 	NIRAS prepare a final document presenting the prepared Guidelines for Shoreline Management and Port Planning in WACA countries



PARTICIPANTS



ACTIVITIES

Month 1: Overall introduction of the program and process. Agree on expectations to the outcome.

Month 2-4: Establish SMP Team in each member state. Sharing of experience and networking. Inspirational SMP presentation by NIRAS.

Month 5-7: SMP Team collect data and perform analysis assisted by input from NIRAS at a number of technical sessions prepared individually for each SMP Team.

Month 8: Sharing results of SMP analysis of experience with all member states.

Months 9-10: SMP Team prepare draft SMP Guidelines with all member states assisted by input from key stakeholders and NIRAS at a number of technical sessions prepared individually for each SMP Team.

Month 11: Sharing draft SMP Guidelines with all member states

Month 12: Preparation of a final document presenting the prepared **Guidelines for Shoreline Management and Port Planning in WACA countries**

OUTPUTS

Month 1: Final tuning of the scope and the process of implementation.

Month 2-4: SMP team established. Action plan for data collection and analysis to be performed by the SMP Team.

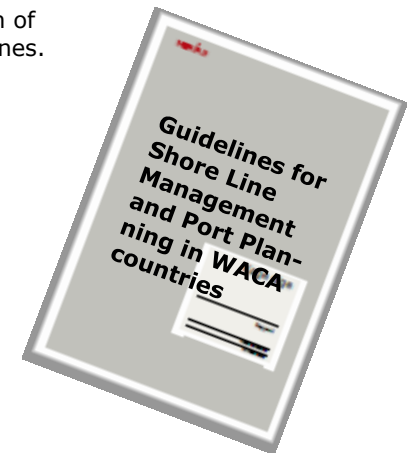
Month 5-7: Key Stakeholders identified, SMP process designed, SMP approaches for Hot spot areas drafted.

Month 8: Action plan for elaboration of draft SMP guidelines.

Months 9-10: Draft SMP Guidelines

Month 11: Presentation of SMP Guidelines.

- WACA countries' ministries responsible for shore line management
- WACA countries' ports authorities
- Financing agencies
- SMP groups
- NIRAS



5 Tasks and outputs

In order for the program to become a success, it is crucial that all the participants are committed to the overall idea of SMP and are contributing with their experience and challenges. Sharing of the participants' experience from previous and ongoing Shoreline Management projects is a ground stone for NIRAS' ability to assist evaluate the present situation and to come with a world class evaluation and suggestions for improvement in the future.

It is our understanding that even though the WACA countries are facing the same challenges, the level of their awareness and expertise on the subject may vary to a great extent. It will be one of NIRAS' primary tasks to assist in sharing and homogenizing the knowledge of the program of the participants and to take it on a higher level.

The final product of this program, the Guidelines for Shoreline Management and Port Planning in WACA countries, will be a fine tool, where it will be possible to find inspiration and solutions for the most critical issues. The Guidelines will make it possible not only dealing with current issues, but also to plan for future challenges.

The Guidelines will focus on the issues of importance to the WACA countries.

The Guidelines will not only evaluate the challenges and solutions in general for WACA countries, but will deal with them for each country-participant in particular, being as specific and country oriented as possible.

Another important outcome of this program will be the establishment of the network of the professional, political and financial institutions of the WACA countries. The well-functioning network will ease the knowledge sharing and decision making in the future and will act as a mean securing a continuous awareness raising.

More specifically the programme includes the following tentative tasks and expected outputs:

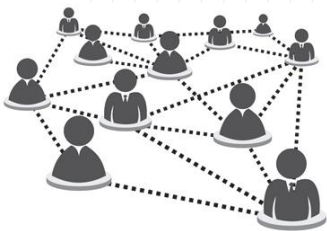
Tasks 1: Kick-off meeting

The process starts with a kick off meeting where the program will be presented and participants introduced to each other. Due to COVID 19, the meeting and upcoming conferences may partly or entirely take place using the "Zoom" application. At the meeting, NIRAS will introduce the consultant's team, explain the process and start a dialogue with all the stakeholders.

Output: Final tuned programme

Tasks 2: SMP Conference 1

NIRAS will call for and facilitate a conference with participation of West African countries' Ministries responsible for climate adapted Shore Line Management and Port and Lagoon planning and in their respective countries. During this conference, the WACA members will establish their SMP Team and share experience, challenges, concerns, ideas for improvement, etc. in relation to Shore Management Planning and adaptation to climate changes. The so-called "hot spots" involving ports and lagoons (areas of most concern) will be identified for further analysis. Finally a detailed work programme with actions/subtasks for the analysis to be included in Task 3 is agreed upon. The conference may be divided into two steps dealing with the various subjects.



Output: SMP Teams established and Hot Pot Areas identified and the general awareness raised on the importance of SMP.

Task 3: SMP analysis including CVRA with focus on of Hotspot areas

The SMP Team will implement the work programme developed on the conference No 1 assisted by a number of training lectures and workshops facilitated by NIRAS. The following four subject will be addressed among others:

1. To establish stakeholder forums/groups in order to share information, to coordinate planning and to gain consensus for the preferred policies
2. To define, in general terms, the vulnerability and risks to people and the developed, natural and historical environment within the SMP Zone of the target area over the next 100 years
3. To identify the preferred policies for managing the shoreline risks and to identify the consequences of implementing the preferred policies
4. To defines challenges and obstacles and drivers for the future development.

The results will be the division of the coast into management cells and identification of key issues and overall SMP approaches to deal with in the future with particular focus on the selected hot spot areas.

Output: Key Stakeholders identified, SMP process designed, SMP approaches for Hot spot areas drafted.

Task 4: SMP Conference 2: Sharing SMP experiences and generic SMP Guidelines

The participants will be called for a conference where the SMP teams are sharing the highlights of the analyses and receive feedback from the participants. NIRAS will examine the output of task 3 and present technical feedback and carry out teachings of subjects of relevance for each country and the drafting up of a generic SMP guidelines.

Output: Draft generic SMP Guidelines and action plan for elaborating the draft SMP for each country.

Task 5: SMP Guidelines

The local SMP teams elaborate SMP Guidelines for their respective country. NIRAS will assist through technical sessions individually arranged with each SMP Team.

Output: Draft SMP Guidelines.

Task 6: Conference 3 Sharing SMP guidelines

The local SMP teams will present and share their draft SMP Guidelines.

Output: SMP Guidelines presented and shared.

6 Evaluation of impact

Coastal planning is a complicated process involving many stakeholders and many complicated physical and ecological processes. The SMP is a powerful tool to guide and facilitate this planning process.

The impact of this **innovative idea** is implicit lying in the SMP process as results of clarity, understanding, and awareness raising, showing how all the parameters involved are playing together giving a direction, which will ensure prosperity and long-term sustainable development.

The SMP strategy proposed is generally feasible in the context of shoreline management and particularly feasible for port and lagoon operations and may demonstrate clear value proposition of solving the identified problem/s, with a real likelihood to succeed;

The idea is adaptable to the national and local context and the solution is implemented in the context of WACA countries (both physical and feasibility, but also financial and O&M);

The impact will be a clear measurable impact on erosion (improvement of sediment disruption and reducing coastal erosion) in general on the shores of the WACA member and in particular on the planning and operation of ports and lagoons.

The solution presents additional benefits including environmental and socio-economic and demonstrates viability in developing or emerging countries and the capacity to be deployed within the next 3-5 years.

7 Presentation of the consultant's team

We propose an extremely strong team of consultants with wide theoretical background and practical experience gained from a great number of similar projects from amongst other West Africa.



JAN DIETRICH, PROJECT MANAGER. Solid professional background in hydrodynamics, ports, coastal and environmental disciplines achieved as technical adviser, project manager and team leader in a variety of assignments in and abroad since graduation in 1970. General experience within planning and design of ports and coastal protections adapted to the forecasted climate changes. Participated as team leader and being overall responsible for carrying out many ICZM/SMP processes.



KARSTEN HOLGER MANGOR, SMP, SEDIMENT TRANSPORT/ SEDIMENTATION/ SHORELINE MANAGEMENT. Karsten Mangor has more than 40 years of experience in the areas of coastal hydraulics/morphology, coastal protection, waterfront developments, sedimentation, environmental impact assessment and coastal adaptation to climate changes. Mr. Mangor is the author of a number of scientific publications and textbooks/articles on these subjects. In December 2004 he published a manual on coastal processes and shoreline management entitled on Shoreline Management Guidelines, a new edition is published in March 2017 as an e-book, which is available at www.dhigroup.com. Mr. Mangor was the chairman for a PI-ANC Working Group who published the Report no. 123 – 2014 entitled: Countries in Transition: Coastal Erosion Mitigation Guidelines. Mr. Mangor has also published several articles on waterfront developments.



CHRISTIAN HELLEDIE, DESIGN. For almost 20 years Christian has worked brought with coastal and flood protection as project manager and coastal engineer. Christian has significant national and international experience from coastal projects in Denmark, Europe, Middle East, Africa, Asia and North America. The project experience includes coastal protection, shore protection, shoreline management planning, flood protection, climate adaptation, ports and harbours, access channels and sedimentation, waterfront developments and man-made beaches. Christian's technical skills cover all project phases from site assessment and development of concepts, numerical modelling of hydrodynamics as well as sediment transport and coastal morphology (MIKE 21 BW/HD/SW/ST and MIKE3 HD/SW/ST and LITPACK) and detailed design, drawings and tender documents.



KLAVS BUNDGAARD, SEDIMENTATION. Klavs is one of the industry's most experienced project managers, hydrodynamic, sediment and environmental experts. He has project experience from major infrastructure projects, environmental projects, flooding projects, coastal projects and port projects. He has worked as a modeller, senior expert, specialist, project manager, business area manager and most recently as group leader. Klavs has extensive experience from a wide range of challenging projects around the world including the USA, UAE, Singapore, Australia, Brazil, the Middle East and Europe. His project portfolio covers almost all challenges related to currents, waves, water levels and sediment in the sea and on the coasts.



SIGNE SCHLØER, MODELLING. Signe Schløer is specialized in the fields of hydraulics and wave dynamics. Signe has the last years been involved in several projects regarding coastal protection and flood protection. The projects concern design of revetments, breakwaters, dikes, calculations of sediment transport and plans for beach nourishment. In addition, Signe works with sediment transport and spreading of sediment in connection with dredging analysis. Latest Signe has been involved in a Climate Change Vulnerability and Risk Assessment regarding the coast of Gambia. Signe participated in the inception and inspection phase. Furthermore, Signe was responsible for the numerical modelling and analysis of coastal evolution due to climate changes. Signe is very strong in the field of numerical modelling due to her education and succeeding project experience. In her work Signe uses model from DHI such as LITPACK, MIKE SW-, HD and ST.



MADS MØLLER, MODELLING. Through the past several years Mads has worked as project manager and assistant project manager within coastal projects, oil and gas projects and port projects in Denmark and abroad. In addition to project management, Mads has worked as a project engineer on projects in and around the coastal zone, and through this has developed specialized competences in hydraulic modelling, coastal and stormwater protection, planning of coastal projects, port planning and environmental impact assessments. Within hydraulic modelling, Mads has experience in analysing wave dynamics, sediment transport, coastal zone dynamics, coastal development, metocean studies, wave disturbance and ship mooring analysis. In addition to extensive hydraulic modelling, Mads has experience with CFD modelling of wave propagation and wave loads on offshore structures.