EXCELLENCE IN LOGISTICS
dredging the New Suez Canal in a year

SECURING SAFETY
understanding the risks of mooring

RELAYING THE RIGHT MESSAGE
clear communications benefit dredging projects
Guidelines for Authors

*Terra et Aqua* is a quarterly publication of the International Association of Dredging Companies, emphasising “maritime solutions for a changing world”. It covers the fields of civil, hydraulic and mechanical engineering including the technical, economic and environmental aspects of dredging. Developments in the state of the art of the industry and other topics from the industry with actual news value will be highlighted.

- As *Terra et Aqua* is an English language journal, articles must be submitted in English.
- Contributions will be considered primarily from authors who represent the various disciplines of the dredging industry or professions, which are associated with dredging.
- Students and young professionals are encouraged to submit articles based on their research.
- Articles should be approximately 10-12 A4s (4000 to 6000 words). Photographs, graphics and illustrations are encouraged. High quality, original photographs are acceptable. Digital photographs should be of the highest resolution (300 dpi and at least 1 Mb, preferably more).
- Articles should be original and should not have appeared in other magazines or publications. An exception is made for the proceedings of conferences which have a limited reading public.
- In the case of articles that have previously appeared in conference proceedings, permission to reprint in *Terra et Aqua* will be requested by the editor.
- Authors are requested to provide in the “Introduction” an insight into the economic, social and/or environmental drivers behind the dredging project to the editor.
- An emphasis is placed on articles which highlight innovative techniques and applications.
- By submitting an article, authors grant the IADC permission to publish said article in both the printed and digital versions of *Terra et Aqua* without limitations and remuneration.
- Authors are requested to provide extra material such as additional photos, links to reports from which articles have been excerpted or short videos.
- In case the author does not agree, please inform IADC (terra@iadc-dredging.com).
- All articles will be reviewed by the Editorial Advisory Committee (EAC). Publication of an article is subject to approval by the EAC and no article will be published without approval of the EAC.

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EDITORIAL

CHALLENGE IN LOGISTICS: NEW SUEZ CANAL PROJECT
BAS VAN BEMMELEN, WIM DHONT, OSAMA FAROUK EID, MENNO NAGEL AND KENNETH WILLEMS

The New Suez Canal project was a titanic effort in logistics. Six global dredging contractors completed the works within one year and several records were broken during the execution of the project. The contractors disposed of more than 245 million m$^3$ of sand in just nine months.

SAFETY IN MOORING
BRAM SLUISKES

The risks of mooring operations in the dredging industry cannot be overstated. Equipment, training and competence of personnel, and technology are the different factors that play a part in safe and efficient mooring work.

HOW CLEAR COMMUNICATIONS BENEFIT DREDGING PROJECTS
MARSHA COHEN AND RENÉ KOLMAN

Dredging projects impact a wide variety of stakeholders. Over the years dredging contractors and clients have become more aware of the public’s need for information. Keeping clear communications open with all stakeholders, especially the public can benefit dredging projects.

BOOKS/PERIODICALS REVIEWED

Learn about classification of different soils and rocks for dredging operations and read the books, The Ecological Effects of Deep Sand Extraction on the Dutch Continental Shelf and Dynamic Analysis and Design of Offshore Structures. The newest Facts About on Underwater Drilling and Blasting is also available for download.

SEMINARS/CONFERENCES/EVENTS

Check out the latest list of seminars, conferences and workshops from across the globe in 2016. This list includes the IADC Seminar on Dredging and Reclamation in Singapore and the European Ecosystem Services 2016 Conference in Belgium.
We are half-way through the year and many interesting projects are in the midst of completion or have been completed in the dredging industry. One major project, the Panama Canal Expansion, an operation that began nearly a decade ago in 2007 is close to being completed. In fact, it is scheduled to be finished on June 30 this year. According to released figures, about 40,000 workers have worked on the project.

If we were to stay on the topic of massive dredging projects, the New Suez Canal Project is one that needs highlighting. In fact, the first article, “A challenge in logistics: New Suez Canal Project” in this June edition of Terra et Aqua delves into one of the biggest dredging operations of the century. The Suez Canal Authority (SCA) unveiled a plan to expand the canal and build a new lane to allow transit for ships in two directions. This eventually resulted in six dredging companies from two different consortia carrying out the works within a year’s deadline. The feature focuses on the intensive logistics effort that took for the companies to complete the project.

Another essential issue to note about the project is that despite the large number of vessels that have worked on the site, not one was involved in an incident. Usually, a high concentration of vessels in one area increases the risk of collision or incidents. The excellent record in safety in the New Suez Canal operation was due to the high standards of safety maintained by the contractors. It is also a reflection of safety standards in the dredging industry as a whole.

The International Association of Dredging Companies (IADC) is also committed to promoting safety in the industry. In fact, IADC established a Safety Committee that enables the sharing of best practices amongst its members. One of the ways to highlight the importance of safety within the dredging industry is the IADC Safety Award. This award is intended to encourage the development of safety skills on the job and to reward people and companies demonstrating diligence in safety awareness in the performance of their profession. Nominations for this award recently closed. The IADC Board of Directors will present this award to the winner at the IADC annual general meeting (AGM) in September in Cascais, Portugal.

This Terra edition also features an article regarding safety in the dredging industry. “Safety in mooring” discusses the risks of mooring within dredging operations since vessel to vessel mooring is done very often in the industry. The feature goes into detail about the different equipment and software involved in mooring work and how human factor can positively or negatively impact such operations.

“How clear communications benefit dredging projects” is the third article of this issue. The feature highlights how good communication between dredging contractors and stakeholders can eventually benefit all involved groups. The article gives examples of different dredging projects across the globe and how clear communications and disseminating the relevant information by the contractor from the beginning to other stakeholders was essential to project success.

This issue also features reviews on some interesting and informative books and journals. It includes a book, The Ecological Effects of Deep Sand Extraction on the Dutch Continental Shelf that discusses the effects of deep sand extraction in the Maasvlakte 2 project.
ABSTRACT

One of the biggest dredging projects of the current century, the New Suez Canal was, according to experts, a titanic effort in operations, planning and production to complete within the one year deadline.

Opened in 1869 after 10 years of construction, the Suez Canal was one of the greatest maritime projects of the time. It was only wide enough for one-way traffic, and transiting ships would stop in a passing bay to allow the passage of ships in the other direction.

Almost 150 years later, the need for increased capacity had become clear to the Government of Egypt. In 2014, the Suez Canal Authority unveiled a plan to expand the canal and build a new lane that would allow the transit of ships in two directions. When the tender was offered, one caveat was that the work would be completed in one year’s time. Six major dredging contractors ultimately were able to achieve this by an intensive logistics effort. Although the dredging contract itself was traditional, the execution period of less than a year was exceptional. Several milestones were achieved and records were broken during execution. The most spectacular was that, the dredgers from all contractors moved a total of more than 245 million m³ of sand in just nine months. Another milestone achieved during the project was that it involved the largest number of dredgers ever deployed on a single project – 28 units and over 40 pieces of auxiliary equipment.

INTRODUCTION

Opened in 1869 after 10 years of construction, the Suez Canal was one of the greatest maritime projects of the time. The artificial waterway allowed ships to travel more directly between Asia and Europe, instead of navigating around Africa, thereby reducing the sea voyage distance by about 7,000km (4,300 miles). This clearly expedited travel and trade between the East and West.

The original canal was too narrow for two-way traffic, and ships had to stop in a passing bay to allow the passage of ships in the other direction. When the tender was offered, one caveat was that the work would be completed in one year’s time. Six major dredging contractors ultimately were able to achieve this by an intensive logistics effort. Although the dredging contract itself was traditional, the execution period of less than a year was exceptional. Several milestones were achieved and records were broken during execution. The most spectacular was that, the dredgers from all contractors moved a total of more than 245 million m³ of sand in just nine months. Another milestone achieved during the project was that it involved the largest number of dredgers ever deployed on a single project – 28 units and over 40 pieces of auxiliary equipment.

Funding for the project was achieved quickly. Most of it came from the Egyptian public who were invited to participate in the purchase of interest-bearing investment certificates. The US$8.4 billion goal was achieved in 8 days.

Soon after financing was completed and tenders offered, contracts were signed by the

<table>
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<th>Amount of sand disposed of:</th>
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<tr>
<td>SCA/ Lot 1: 15 million m³</td>
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<tr>
<td>Challenge Consortium/Lot 2-5:</td>
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<tr>
<td>More than 200 million m³</td>
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<tr>
<td>Dredging International &amp;</td>
</tr>
<tr>
<td>Great Lakes/Lot 6: 45 million m³</td>
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Above: A bird’s eye view of dredging operations at Lot 5 at the New Suez Canal Project site.
SCA with two consortia. The Challenge Consortium (the Consortium) comprised of National Marine Dredging Company (NMDC) from Abu Dhabi; Dutch dredging companies, Royal Boskalis Westminster (Boskalis) and Van Oord; and Jan De Nul NV (subsidiary of Jan De Nul Group) from Belgium. The total contract value amounted to US$1.5 billion that was divided amongst the four partners. The second consortium, Dredging International NV (an operating company of DEME Group) from Belgium and Great Lakes Dredge & Dock Company (GLDD) from USA received the assignment to deepen and widen the western branch of the Suez Canal, worth US$540 million.

One essential prerequisite of the contracts, however, was that the project be completed in a year, an extremely short deadline for the amount of work. Therefore, due to the sheer size of the project, the work was divided into six lots to be carried out from 51.4 - 122.4km of the length of the canal. The SCA and the two consortia carried out the works in the various lots. The SCA did the work on Lot 1. The Consortium carried out the works on Lots 2 to 5 (from 58.2 - 92.6km). The final Lot 6 was completed by the consortium of Dredging International (DI) and GLDD.

Furthermore, before the dredging operations could begin, dry excavation works in the Sinai desert had to be carried out by the Armed Forces Engineering Corps of the Egyptian Army – the armed forces had to clear 250 million m³ of dry earth.

The expansion of the canal was completed as planned by 6 August, 2015 in time for the inauguration. The current extra lane is between 147m and 177m wide across the bottom and 24m deep.

THE CHALLENGE CONSORTIUM WORKS ON LOTS 2-5

An ongoing effort in mobilisation

Mobilisation was a herculean effort according to the experts of the Challenge Consortium. Ensuring that all the equipment and people were in place and operations carried out within the tight project deadline was the greatest of logistical challenges.

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Figure 1. Left: The illustration shows the original Suez Canal waterway; Right: Illustration of the New Suez Canal work carried out by SCA, the Challenge Consortium (Lots 2-5) and DI-GLDD consortium (Lot 6)
The partners had to ensure that they could mobilise immediately after the contract was signed and already during the tender phase, they had started to look into the availability of various equipment and people. During the preparation of the works, a detailed planning was drafted for swift mobilisation. In fact, the first dredger – Al Mirfa from NMDC – was on site two weeks after the contract was signed. All four partners mobilised their dredgers from all over the world. This was organised from each of their head offices. Since the vessels and other equipment could only be utilised when they were available from their other projects, mobilisation was an ongoing process during the project. Once the Suez project headquarters was established in Ismailia, a city in northern Egypt, on the west bank of the Canal, the logistics experts were sent to the site in Egypt and mobilisation continued from there. The contract was signed on 18 October, 2014. On that date, Van Oord’s cutter suction dredger (CSD) Hercules was on her way back to Rotterdam from Brazil and was immediately re-routed to Suez on a semi-submersible transport vessel (Figure 2). The ship arrived on site 10 days later on 28 October 2014, a few hours after CSD Al Mirfa arrived. The other dredgers were mobilised as soon as they were available. Seven months into the job, some of the small dredgers were already demobilised and in the last month, a large self-propelled CSD was mobilised to finish the project on time. Besides equipment, Van Oord sent about 250 employees (staff and crew) for work on site.

Boskalis started making preparations for the mobilisation in mid-September, weeks before
the contract was signed. That included such efforts as mapping of its equipment, talking to transporters including its wholly-owned subsidiary Dockwise, provider of heavy marine transport services, to block space for transport vessels, if the contract were to be awarded.

The vessels for Boskalis (Figure 3) came from across the globe and its first vessel was on site by early December. In fact, the first vessel was loaded a week before the signing of the contract and started sailing a day after the signing of the contract. Its last vessel was at the site in the beginning of July 2015, three weeks before completion. The Suez job required so much equipment that when any equipment, crew and staff from other jobs became available, they were sent to the Suez project. The organisation also sent about 400 people for the project – around 80 staff and 320 crew members.

Jan De Nul also started working on their mobilisation plans around September 2014 until the contract was signed. During the course of the tender and negotiation process, the organisation started looking into their available equipment. A total of 7 CSDs were sent for the project – two vessels came from Dubai, two from Vietnam, one from Singapore. The last two, one from Panama and one from Belgium, were mobilised during the course of the project (Figure 4). In addition, 20km of land pipeline and 3km of floating pipeline were sent. The first vessel arrived during the second half of November, one month after signing. The organisation also sent about 600 people for work on site.

NMDC mobilised its equipment immediately after the contract was signed and its units were mobilised from two locations in Abu Dhabi – Port Khalifa and Mina Zayeed (Port Zayed anchorage area). Since the sailing time is around two weeks, the first dredger at the site was NMDC’s cutter suction dredger Al Mirfa (Figure 5). CSD Al Mirfa with a barge, multicat and two tugboats was on the first load and it arrived on the project on the 28 October 2014. Other units and auxiliary equipment were sent on another six loads throughout the project. The dredging company sent a total of 20 units that included 5 CSDs for the project. NMDC also sent a total of 577 people – of this group, 22 were
Besides accommodation, water, food, waste the work sites within 10 to 30 minutes. Tenders, that is transfer vessels, were used to ferry crew back and forth from personnel. Tenders, that is transfer vessels, were positioned at a central point for each working zone to cut down the transfer time of barges and the cruise ship were accommodated up to 190 persons each, while Vivaldi and Ocean Majesty could accommodate up to 295 and 325 people, respectively. Moreover, the barges and the cruise ship were hired. Also, four hotels were used to accommodate crew and staff. The accommodation barges for the project included big mess rooms, gym area, prayer rooms and recreational areas. As Ocean Majesty was a cruise ship it had more amenities including a swimming pool (Figure 6).

The barges Verdi, Puccini and Bellini were equal in size and could accommodate a maximum of 190 persons each, while Vivaldi and Ocean Majesty could accommodate up to 295 and 325 people, respectively. Moreover, the barges and the cruise ship were positioned at a central point for each working zone to cut down the transfer time of personnel. Tenders, that is transfer vessels, were used to ferry crew back and forth from the work sites within 10 to 30 minutes. Besides accommodation, water, food, waste and fuel were issues that needed to be addressed. A Consortium expert states that it was akin to running a floating town for close to a year. During the peak of the project, a team of about 150 to 200 site supervisors and operations people were handling these issues. Several local suppliers (ship chandlers) were contracted for various services such as catering and cleaning. With intensive work being carried out, the vessels kicked up a lot of sand sediment and it was difficult for vessels to make their own water as when in open seas. Water and different types of food, suited to the workers’ various cultures, had to be provided on a daily basis. Water was supplied by water trucks and supply vessels. Also, barges came to collect garbage to be sent to proper disposal areas.

Fuel was efficiently delivered by the client and not a single vessel ran out of fuel during the entire duration of the project. During peak production, the vessels were consuming about 1,200 tonnes of fuel per day.

Maximising production during project phase
Before the project could begin, the client had to prepare the site for the works. Some areas of the land were at +24m, so the Egyptian army removed 250 million m³ of dry earth to prepare the area for the dredging work to commence.

All equipment had to be placed at different locations at the site to maximise their production capabilities in order to finish the work on time. To achieve this, a Planning and Production department comprising experts from the different partners was put together as soon as the project was awarded. During the project, an average of 15 experts were on the team, based in the headquarters.

Various cutters were assigned to work simultaneously in the different lots (see satellite image, Figure 7). For operational efficiency, each partner was responsible for one lot. The day-to-day operations such as deploying the vessels and efficient disposal of dredged material were allocated by the Planning and Production department to a particular lot.

Jan De Nul was in charge of Lot 2, Boskalis worked on Lot 3, Van Oord managed Lot 4, while NMDC was on Lot 5 (see Figure 8, collage on next page).

In fact, the work was so efficient that the Consortium reached a record-breaking production of more than 1.4 million m³ a day.

Disposal areas for dredged sediments were also located along the new canal on both sides and workshops were located close to different lots for wear and tear and maintenance. A central workshop was located on shore in the middle of the project between Lots 3 and 4 comprising a welding workshop, a mechanical workshop, a dry plant workshop and a large general storage area. There was also a floating (mainly welding) workshop located in front of the central workshop and smaller workshops were located in each lot.

Maintaining a safe environment
Safety is an essential priority for any dredging project and the New Suez Canal Project was no exception. However, the Consortium had the extra task of taking into account the strategic nature of the Suez Canal area.
Close up of NMDC’s cutter suction dredger Al Sadr at work

Cutter suction dredger Leonardo Da Vinci carrying out dredging

First test passage of a vessel in the New Suez Canal with CSD Artemis to the left

Dredgers operating at night in the New Suez Canal Project site
Army was in charge of removal and disposal of any found objects.

Health and safety were another major priority for the Consortium, especially since the project site was not easily accessible. It engaged the services of the Travel Clinic of the Port Hospital (Havenziekenhuis) in Rotterdam. Consultants from the Clinic counselled the Consortium to make certain provisions such as having nurse stations on all accommodation vessels and offices. There was also a hospital on board Ocean Majesty. The Clinic also scouted the local hospitals in Ismailia to see the level of care and gave advice on the preparations that the Consortium should take and where to go in case of emergencies. Also, an emergency plan was put in place for clear pick up points on shore with travel instructions for the ambulances to the hospitals.

LOT 6: THE WORKS AT THE GREAT BITTER LAKE

Lot 6 works were carried out by the second consortium, Dredging International (DI) and Great Lakes Dredge & Dock Company (GLDD). DI completed 75% of the works and GLDD carried out 25% of the project. The contract for this Consortium was also awarded in October 2014.

The work on Lot 6 was to deepen and widen the western branch of the Suez Canal at Great Bitter Lake, Deversoir Reach and Kabreet Reach – an additional 250m wide, 24m deep, and 29.5km fairway through the Great Bitter Lake and the access channels to the lake would be widened to 140m.

This consortium also mobilised a large amount of equipment for the project to be completed by the stipulated deadline – 4 cutter suction dredgers, 6 trailer suction hopper dredgers, 42 auxiliary vessels from DI and 2 Middle-East based cutter suction dredgers (Ohio and Carolina), 1 trailer suction hopper dredger (Sugar Island) and other auxiliary equipment from Great Lakes.

Mobilising for a different terrain

DI started its tender in the first weeks of September 2014 and submitted the tender around 20 September. The client took about
the United Arab Emirates (UAE) also arrived around November. Another 80% of equipment and vessels arrived between December and the beginning of February, with vessels coming from countries from both the East and the West such as Belgium, the Netherlands, the UAE, Singapore and Australia (Figures 10 and 11).

About 950 people (crew and staff) from DI were sent for the project. The commercial department staff were there before the contract was awarded but after the first week, a few other staff were sent to the site. By December, most of the staff had arrived and local labourers were on site between March and April. The number of staff fluctuated depending upon the phase of the project – between 10%-25% of the total work force were staff, while the rest were crew.

Remodelling equipment for the project
DI had to remodel a couple of pontoons for the project work. The contractor had to make an investment to transform two pontoons – one into a spider pontoon and a floating workshop (Naseem) and another into a floating workshop (Thornton 1); DI started making preparations for the technical modification (spider pontoon) during the negotiation period in October. On the day the contract was awarded, the management gave the green light to the technical department to transform the pontoon and the modifications were done in UAE.

Lot 6 was quite different in scope from the other lots, as the project site was not located in the Sinai desert, but at the Great Bitter Lake area (and the adjacent reaches). This meant a different methodology had to be applied as there would be more interactions with the ongoing Suez Canal traffic. As the DI tender team was made up of people who were experienced in the Panama Canal Expansion Program, where this was also the situation, the team anticipated SCA’s issues and proposed solutions in the tender proposal. For example, in its technical solution proposal, DI elaborated a full traffic management plan for ongoing transport traversing the Canal.

As with the other contractors, DI’s equipment was mobilised from across the globe. Their biggest cutter, D’Artagnan, was immediately mobilised at the time of the signing as she was at another project in Siberia (Figure 9). The D’Artagnan was re-routed to Belgium for a quick stop for a few days to take spare equipment for Suez and then set sail to the project site. The CSD was on site on 26 November, five weeks after the contract signing. Other equipment and pipelines from four weeks to look into the tender documents and negotiate. During this time, DI started looking into site investigation and possible mobilisation on where to place pipelines, what vessels to use, and which equipment to buy.
The transformed spider pontoon had two loading systems on top of it. They were akin to wings where pipelines are connected to the barge and can move down. Not only were barge loading pontoons transformed, other equipment was also needed to be assembled such as a workshop for cutter heads and extras on that pontoon. The full modification was completed in UAE and at the end of December, DI mobilised the whole spread to Suez.

GLDD rapidly mobilised its Middle East-based heavy duty, high production cutter suction dredgers, the Carolina and the Ohio, as well as their auxiliary support equipment and TSHD Sugar Island, to execute its portion of the work.

Steering cooperation
Both partners, DI and GLDD, worked together to ensure there was synergy in work when possible. Various committees such as a Technical Committee that included planning and production work, a Financial Committee and a Board, each with six members steered cooperation between the partners. These teams were established when the contract was awarded.

Also, during the production phase, each partner had its own disposal area and tried to keep dredging operations as separate as possible whilst still trying to work together when it came to logistics such as using a dockship for mobilisation and coordinating on using sinker lines in the existing Suez Canal.

Accommodating staff and crew
Most of the vessels had their own accommodation but DI also rented a houseboat, Rossini, with a capacity of 110 cabins. Also, the organisation had booked a few hotels and rented villas for staff. The villas were situated on the left side of the Great Bitter Lake and they were easy to protect as there only one road on the peninsula. Some of these villas also served as offices for the DI-GLDD consortium – one office for general management, one for operational management and one for Great Lakes.

The organisation also had contracts with local suppliers with regards to food (they also had several supply ships). They had over 40 auxiliary vessels and these vessels were used for purposes such as fresh water, fuel, garbage, sewage and sludge. The vessels that had accommodation on board had their own laundry as did the houseboat.

Safety and security were also major issues for the DI-GLDD consortium and so they had safety and security experts and guards to create a safe working environment. Doctors were on standby in case of emergencies. The Egyptian army had tight security around the premises. Also, DI came across several UXO after having done several investigations such as with a magnetometer survey but did not have any incidents.

CONCLUSIONS
The successful completion of the New Suez Canal Project within a year by the two consortia was a testament to their logistical and operational achievements in terms of coordinating the sheer number of equipment, staff and crew as well as handling various logistical and operational challenges. As the original Suez Canal became a historical achievement, so too will the New Suez Canal – it will serve as an iconic project for the dredging industry for decades to come.

It is also essential to note that the project was ultimately undertaken to realise the Egyptian government’s aims to improve the national economy. The second lane reduces waiting times for transiting ships, facilitates traffic in two directions and increases the numerical capacity of the waterway. The drop in waiting times reduces fuel expenditures and costs for ship owners, which is meant to attract more ships including mega-cargo vessels to the waterway. The SCA expects the revenues to increase from US$5.3 billion at present to US$13.2 billion by 2023.

The New Suez Canal Project is also meant to support the Suez Canal Area Development project – a special economic zone in the heart of the Suez Gulf of Egypt to attract both Egyptian and foreign investors – that will boost the national economy. This in turn will help create job opportunities for people living in the Canal Zone, Sinai and neighbouring areas and create new urban communities.

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SAFETY IN MOORING

ABSTRACT

According to the International Maritime Organization (IMO), “shipping is perhaps the most international of all the world’s great industries and one of the most dangerous.” Ships enter and leave ports regularly. Tying up a ship when alongside a berth or another vessel is potentially a very hazardous operation, unless everyone engaged in mooring operations is trained, has the right mindset and the correct equipment to perform the work.

The risks of mooring within dredging operations are even more important, since vessel to vessel mooring happens very often in the dredging business. For example, hopper barges are regularly moored alongside grab dredgers during loading.

In terms of hardware, mooring equipment is sufficiently controlled by international, national and class regulations with regard to their design and maintenance. However, the best of systems will fail if the human factor and more precisely the mindset for doing the work is not right.

In this article, the risks associated with mooring operations and future developments in the field will be discussed.

INTRODUCTION

Mooring a ship is as old as sailing itself, but there are few activities on board which appear so frequently in accident reports. As a captain once quipped: “I don’t envy the Flying Dutchman as I know it can never make port and is doomed to sail the oceans forever. But that also means they don’t have to moor.”

There are many examples when the activity of mooring went terribly wrong, often with severe consequences for those engaged in mooring operations and even for innocent bystanders. A recent publication, “Risk Focus Consolidated 2016: Identifying major areas of risk” by UK P&I Club, a UK-based organisation providing protection and indemnity insurance across the globe, provides an insight into the types of injuries (with claims over US$100,000) occurring during mooring operations from 1987 to 2013.

The top four injuries that insurance was claimed for were: leg (19%), followed by multiple injuries (14%), death (13%) and back (13%). (See Figure 1 on next page). This leads us to an important question: what makes a mooring operation such a high risk activity? Is it the equipment? Is it because of human factor risks? Is it because it is a team operation during which team members who often do know each other well (vessel crew working and shore-based personnel) have to work together?

What can be done to reduce the risks associated with mooring operations? In the article, the following will be discussed in more detail: the risks associated with mooring operations; mooring equipment; training and competence; the human factor in mooring operations and future developments in the field.

THE MOST COMMON RISKS IN MOORING

The Danish Maritime Authority and the Danish Shipowners’ Association published in their guide “Mooring – Do it Safely”, an overview of common risks and how to prevent accidents during mooring operations. The following are the most common risks:

**Equipment**
- Use of old, damaged wire
- Poor equipment

Above: Hopper barges are moored alongside grab dredgers during loading
• Poorly designed mooring system
• No overview of mooring area
• Hazard/tripping risk sites not highlighted

Work processes
• Lack of communication and planning
• Poor wire/line handling

Crew qualifications
• Lack of knowledge about the hazards of the job
• Unclear instructions
• Lack of information
• Lack of supervision (supervisor involved elsewhere)
• Small, untrained deck crew
• Ineffective on-board mooring training that does not identify and provide an understanding of the dangers associated with snap-back zones

Crew concentration
• Stress and fatigue

Ship’s safety culture
• Procedures not followed
• Shortcuts taken
• Standing in the wrong places (in the snap back zone)
• Standing/walking on a bight
• Walking over a wire
• Quick mooring versus safe mooring
• No risk assessment process prior to mooring operations
• Cluttered mooring area
• Cluttered deck

Weather
• Icy, slippery deck

MOORING EQUIPMENT
Mooring equipment comprises all the equipment required to moor and cast off a vessel effectively and safely. As with all vessel equipment, they must be maintained and operated correctly to ensure safe and effective use. The main parts of a mooring system and the steps to take in order for safe use are as follows:

Mooring winches
These can either be hydraulically or electrically powered. Winch brakes should be regularly inspected and adjusted to ensure that they render below the breaking strain of the mooring line. The Oil Companies International Marine Forum (OCIMF) provides good guidance on the testing and setting of mooring winch brakes.

Remote control stations
They are fitted to some systems. The control can be from the bridge and/or from a fixed control station on the winch deck or via a potable remote control. In all cases, the operator should have had appropriate training with the operation of the winch remote control system. During the operation, the operator should have a clear view of the mooring operation whilst maintaining good communication links with the rest of the mooring team.

Remote camera systems
It is common for modern mooring systems to be fitted with closed circuit TV (CCTV) monitoring which can be monitored from the bridge. These systems are not meant as a replacement for the mooring deck local safety monitoring but only as another pair of eyes.

Ropes and wires (mooring lines)
Mooring lines that are to be used in a mooring operation should be in good condition. Also, ropes should be inspected frequently for both external wear and tear between the strands. Wires should be treated regularly with suitable lubricants and inspected for deterioration internally and for broken strands externally. The safe working load (SWL) of the mooring line should be on the mooring line certificate and this should not be exceeded.

Bitts and static fairleads (chocks)
These should be inspected for signs of deformation, corrosion, abrasive wear and pitting. If there is an indication that any of these are excessive, they should not be used. If they are badly corroded or worn they will cause mooring line damage and/or personal injury due to sharp edges. The safe working load (SWL) should be permanently marked on
or adjacent to these equipment by welded bead.

**Roller fairleads**

These are to be inspected in the same manner as static fairleads, but additional attention should be paid to the rollers. Ensure that they are free to turn and that no excessive axial or radial movement is detected that may indicate a worn bearing. The rollers on button type fairleads are not meant to take axial force. If subjected to axial force due to incorrect mooring line positioning, the fairlead roller may become detached with severe consequences.

In addition to the risks associated with operating mooring equipment there are also risks associated with modifying mooring equipment. Care must be taken that no modifications are made to the layout of mooring arrangements and associated equipment without completing a risk assessment and obtaining the necessary approvals.

**THE HUMAN FACTOR IN MOORING OPERATIONS**

The previous section looked at the actual mooring equipment or the “hardware”, but a safe mooring operation depends on the human factor.

Human factor is a broad concept and can be considered as the “software” both literally and figuratively. Here it refers to personnel engaged in mooring operations and who can be easily injured when something goes wrong during the work, sometimes with fatal consequences. In mooring operations the “hardware” and “software” are interdependent and neither can be utilised on its own.

The concept of human factor in relation to the shipping industry is extensively discussed in the paper, “Safety in shipping: The human element” (Hetherington, Flin & Mearns, 2006). The authors discuss the causal factors within accidents in shipping and identify the relative contributions of individual and organisational factors in shipping accidents. They also emphasise that monitoring and modifying human factors issues could contribute to maritime safety performance.

**Automation**

Vessel operations have been made safer by various methods of automation and there is little doubt that mooring operations can be also more automated. Automation of mooring activities is currently aimed at repetitive mooring – mooring of vessels such as ferries, roll-on/roll-off (ro-ro) and container feeders with a standard hull shape or engaged in fixed routes and vessels mooring along the same quay all the time.

Automatic mooring of vessels that do not have fixed routes, have non-standard hull shapes and those that encounter different mooring lay-outs every time they moor is a much more difficult process. These operations require a more sophisticated type of automation.

Currently, there are two types of automatic mooring being utilised – magnetic and vacuum mooring. These two methods have their advantages and disadvantages. The advantages are:

- there is no need for mooring ropes
- limited amount of personnel are required for mooring operations and they will be mostly engaged in observing the mooring operation
- a quick mooring operation

![Figure 2. A V-shaped mooring bollard](image-url)
The disadvantages are:

- electrical failure could lead to the loss of mooring capacity
- magnetic field causes the ship to become an induced magnet (magnetic mooring)
- the high purchase costs of the systems
- automatic mooring systems require more maintenance

Another approach is mechanising existing mooring equipment – utilising existing vessel mooring components but optimising one or more subcomponents. An example of this is the V-shaped mooring bollard (Figure 2). The traditional mooring wire is still present but it is connected to a ball. This ball-and-wire combination is part of the mooring actuator, which has been designed for mooring and unmooring workboats by Royal Boskalis Westminster. The mooring actuator consists of an arm and two constant tension (CT) winches and can be controlled with a remote control. A hook is attached to the end of the arm, which can pick up the cable. The arm, with the cable, then moves towards the workboat, to place it over the bollard. This working method is considerably safer and ultimately makes mooring faster.

**Situation awareness**

Situation awareness is the ability of individuals to build and maintain a mental model of what is going on at any one time and to make projections as to how the situation will develop taking into account their own actions and the actions of those around them. Thus, situation awareness is especially important in work domains where the information flow can be quite high and poor decisions may lead to serious consequences. For example, a typical mooring operation would mean that the whole mooring team (personnel on the vessel and onshore) has the same mindset with regards to their work. However, often, mooring operations are done on a tight schedule and getting to the same work mindset via lengthy discussions is often impossible.

The best a mooring team leader can do is than use the principle of “chronic unease”. Chronic unease is the opposite of complacency. It is a healthy skepticism about what a person can see and do. It is about understanding the risks and exposures and not just assuming that because systems are in place everything will be fine. It is not just believing in what a person sees or hears or what the statistics state. It is about resetting one’s tolerance to risk and responding accordingly and continually questioning whether what one does is enough.

The thought process of a leader of a mooring operation therefore changes from: “It is going well” to “Is there anything we are overlooking and what else do we need to do?”

When leaders use chronic unease in their work, it enables them to:

- think flexibly
- not jump to conclusions (“think slow”)
- encourage employees to speak up
- listen to others
- be receptive to bad news
- show safety commitment

As discussed before, the concept of “chronic unease” is a state of mind, not a tool. However, this needs to be augmented with standard Health, Safety and Environment (HSE) management tools such as generic risk assessments, toolbox talks and Last Minute Risks Assessments (LMRA). Particularly, the LMRA can be useful to remind a mooring crew that they have a personal responsibility to be aware of risks and to take action when necessary.

**TRAINING AND COMPETENCE IN MOORING OPERATIONS**

To execute a mooring operation safely and efficiently, all involved personnel have to be trained and competent. While the competence of the mooring crew onshore cannot always be assessed or controlled, every effort must be taken that the vessel crew participating in mooring operations are trained and competent.

Training and competence are two sides of the same coin, they are very closely related although there are marked differences:

- Training is the structured approach to increase someone’s knowledge that often involves the undertaking of specific taught courses or on-the-job training where a person is given the knowledge needed to apply theory into practice.

- Competency consists of a number of aspects, of which training is only one. Others include skills, knowledge, experience, appreciation and understanding of the task at hand, the surrounding environment, and a range of human factors.

Training and/or qualifications alone will not necessarily mean that a person is competent. There are many situations where a person’s theoretical knowledge will not be sufficient to execute a task safely. Particularly, during mooring operations, it is experience that teaches one what works and what does not.

Nevertheless, training is an important part to ensure that personnel engaged in mooring operations are competent. After all, everybody involved in a mooring operation should know (Figure 3):

- how to stop a rope by using stoppers (and don’t forget that you have to take them off after use)
- a person does not just delay a rope by using figures-of-eight: instead, he or she should first hitch it twice around the lower side of the bollard

Although sometimes considered outdated, the “learning pyramid” provides a simple framework which presents the most effective ways of learning (Figure 4).

The top part of the pyramid is considered to be “traditional” and “passive” learning. The learner is a passive consumer of information.
The bottom part of the pyramid is considered to be “active” or “participative” learning. In addition to absorbing information, the learner is also a sharer of information.

The concepts of situational awareness and chronic unease, as described in the previous section, can be explained and taught in the upper part of the pyramid. However, it probably it will not make a lasting impact unless information is interchanged between tutor and learner.

**FUTURE DEVELOPMENTS**

The future of shipping has changed considerably over the last decades and will continue to change. One of the major changes will be further automation of vessel operations. But where is the unmanned ship? Unmanned airplanes (drones) are a reality and unmanned cars may just around the corner.

This is where Maritime Autonomous Systems (MAS) come in. As MAS become more reliable and accepted, it is natural that people will start thinking about using the concept for larger commercial shipping operations. Some high profile projects in this field include the European Commission funded Maritime Unmanned Navigation through Intelligence in Networks (MUNIN) project. MUNIN aims to develop and verify a concept for an autonomous ship – a vessel primarily guided by automated on-board decision systems but...
controlled by a remote operator in a shore side control station.

If vessel operations can be automated, so can mooring operations. The magnetic and suction systems are already in use. Using these systems eliminates the use of mooring ropes and hence the risk of injury to shore and ship personnel by these ropes.

New and more intelligent automatic mooring systems should be able to recognise different hulls and ship shapes and compare them with the information from a database in order to position the vessels in the most optimum location to moor.

As for training and competence (management), the trend is to move away from the scholastic / classroom approach of learning where the student is merely a passive learner and move towards interactive schemes (Figure 5).

- Using the latest technology to present an up-to-date training programme. Some examples include:
  - E-learning: suitable to deliver a tailor-made training aimed at the current knowledge / training requirements of the trainee
  - Virtual reality: Meant to be Seen (MTBS) virtual reality devices are most likely be the next step in presenting a realistic mooring environment. An environment which can be adapted to include vessel characteristics and take in account variables such as wind, current, passing vessels and other relevant information. In the virtual reality environment, realistic mooring emergencies can also be simulated without danger to the trainee.
- Using story-telling as a powerful means for sharing and interpreting experiences. Stories are universal in that they can bridge cultural, linguistic and age-related divide. Storytelling can be used as a bridge for knowledge and understanding allowing the values of “me” and “team” to connect and be learned as a whole.
- Story-telling can be done the traditional oral way without any support. But it is more efficient to use the latest technology which will increase the impact of the story. Storytelling is also the most suitable vehicle to get the mindset of “chronic unease” across to other mooring team members.

**CONCLUSIONS**

Regardless of various automation systems or the “hardware”, mooring a vessel with people will always be a necessity. And it looks that for the foreseeable future, personnel (both on the vessel and onshore) will be needed to conduct a mooring operation. Furthermore, in mooring operations, we need to manage the current risks, predict those of the future, and absolutely focus on the human element and carefully consider each individual’s tasks, the competencies needed to carry out tasks and how these will be developed and maintained. The best way of doing that is using the ancient old ritual of storytelling combined with the latest technological developments. Automation of mooring operations will also continue to developed. The future of these automated mooring systems is positive but at the moment they cannot (yet) handle all hull shapes. Furthermore, whether automated vessels are a possibility is yet to be seen.

**REFERENCES**


HOW CLEAR COMMUNICATIONS BENEFIT DREDGING PROJECTS

ABSTRACT

Without a doubt, dredging projects impact a wide variety of stakeholders. Yet, the public’s fundamental lack of knowledge about dredging and its interaction with the environment is not unusual. Scientific studies interfaces between dredging and the environment – plants, animals, hydro-dynamic processes and others – are abundant in the form of environmental impact assessments, pilot projects, trials and continuous surveys and investigations. Making this knowledge available to the public can spare a great deal of aggravation for clients, contractors and the community. According to stakeholders the right to participate in decision-making processes works to everyone’s benefit, preventing delays and improving outcomes. When one is involved with a project and feels ownership, one is less likely to object.

As dredging contractors and clients have become more aware of the public’s need for information, they have also realised that they, as the experts, must play a major role in providing this knowledge. With years of experience confronting an often sceptical public, the industry has sought systematic measures for communicating with them. Studies have shown that when these are applied, they result in transparency and consequently trust. What the projects described here share is that public opposition was a stumbling block and public participation became the solution. From these case studies some best practice guidelines are presented.

INTRODUCTION

Dredging contractors operate worldwide and therefore interact with almost any type of environment – salt marshes, mangroves, coral reefs, tropical rainforests, the arctic, rivers, the deep sea, shallow seas. In this variety of environments, responsible contractors aim to minimise or even prevent environmental impacts. This demands a thorough understanding of the complex web of ecosystem relations and the contractor’s role. Not an easy task. The major dredging contractors invest heavily in R&D and deliberately seek out collaboration with environmental scientists and even have marine biologists on staff. This has resulted in an increased understanding of dredging-induced impacts as well as innovative technologies to mitigate and compensate impacts.

To ensure smooth sailing for a dredging project is demanding. Since most people do not encounter dredging or maritime infrastructure projects very often, their experience with and knowledge of the process is limited. On the other hand, contractors do not necessarily know the specific body of water and surroundings to be dredged. How do contractors overcome the scepticism of the public? How can the dredging contractor and client learn from the public? How can trust be built between all parties?

One thing experience has taught us is that not listening is not the answer. Moreover, pretending that protestors will go away is a costly policy. Time and time again it has been demonstrated that facts, transparency and listening to the concerns of the affected population result in improved efficiency in implementing an infrastructure project.

Communicating upfront before the project is carved in stone takes longer in the beginning. And it is certainly neither easy nor cheap. But
at the end having the support of the community outweighs any negatives and compensates for the time, energy and money invested in listening, educating and explaining the project to the public.

A few examples will be discussed here including the issues surrounding the Port of Melbourne, Australia; Building with Nature projects in the Netherlands; the Berlin Landwehr Canal and other projects. Some cases involve long-term policies that have socio-economic value and others involve an urgent environmental crisis.

What these cases share is that public opposition was a stumbling block and public participation became the solution.

PORT DEEPENING IN MELBOURNE, AUSTRALIA

Australians are generally known as exceptionally hospitable. But welcome to Australia was not on the menu when the trailing suction hopper dredger (TSHD) Queen of the Netherlands sailed into Melbourne harbour. Activists brandishing signs: “Dredging is expensive but our bay in priceless” and “Don’t bugger our bay” greeted the captain and crew. The media chimed in with newspaper headlines such as: “Activists will not be swayed on channel”, “Kiss the fish goodbye fear” and “Queen of all monsters readies for mammoth task”. Daily television reports emphasised the dangers of dredging (Figure 1).

In this less-than-friendly atmosphere, TSHD Queen of the Netherlands was about to start dredging. Prior to her arrival, as part of the environmental assessment for the Port of Melbourne Channel Deepening Project, key environmental and social values were studied extensively, environmental impacts were evaluated and monitoring programmes were planned. However, as a result of the protests from some members of the public and by local media, the dredging works were delayed.

Although a rigorous environmental approval process had been followed by the Port of Melbourne Corporation (PoMC) and regular dredging had been conducted over the past century, very little concrete information was available to the public. This clearly had to change.

Advances in technological communications like the Internet increased the speed with which information – true or false – was distributed. The announcement of the dredging project consequently resulted in a massive public reaction. Given that dredging by its nature is invisible, because most activities go on below the water’s surface, some scepticism and misunderstanding could have been predicted.

Real and perceived threats

To understand the opposition to the project one has to understand the real and perceived threats. The port deepening operations were located at the Entrance close to the Port Phillip Heads Marine National Park (Figure 2). The Park includes an underwater canyon ranging from 80 to 100m deep. Port Phillip Bay itself is characterised by clear water with high visibility. It is rich in many species of fish...
From June to October 2005, this trial was executed by the Queen of the Netherlands. Despite the collection of reliable data and approval by the Government protests continued. Public outcry eventually led to a Supreme Court challenge.

Turning the tide

What finally made a difference in swaying public opinion was the cooperation between the contractor and the client and stakeholders. Taking the public’s concerns seriously and addressing these concerns carefully was paramount. To communicate successfully with the public, the team of the PoMC and the contractor had to acknowledge the assets of the area as well as the perceived threats of the dredging operations. They had then to present means to remedy the threats and protect the assets.

According to an old adage, talk is not cheap, but the alternative is even more expensive. Ultimately, to achieve acceptance meant that more environmental assessments were required and that the PoMC and the contractor had to rethink their approach to communicating with the public.

In March 2007, the SEES was submitted for public review and subsequent governmental approval process, which included a six-week long panel enquiry. It was executed at a cost of US$80 million and represented over two years of peer-reviewed investigation. It comprised 15,000 pages of data and research and 40 new technical studies, which incorporated findings from the trial dredge. The most stringent environmental requirements were put in place. In addition, the cooperation of the dredging contractor was essential to engaging the community in discussions and in developing dedicated means of communications, as did the port’s willingness to inform the public at its weekly media conferences on project progress, project schedule and turbidity, airborne and underwater noise monitoring data. These weekly reports helped the public understand how some risks can indeed be mitigated.

Through reliable communications, a true dialogue developed. This made it possible to better educate the community and allay their fears about the Channel Deepening Project.
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How Clear Communications Benefit Dredging Projects

Pursuing a proactive, multi-faceted media and community relations programme alongside a significant financial investment in robust scientific research was necessary to meet a rigorous project-approval regime. A fundamental belief from the port and the dredging contractor emerged that the public has the right to know and that environmental and social issues are equally as important as economic issues. The community’s concerns must also be the concerns of the contractor and client. What started as a confrontation ended as a positive learning experience for all parties (Figure 3).

THE BERLIN LANDWEHRKANAL: PUBLIC PARTICIPATION

In a recent paper presented at PIANC’s Smart Rivers Conference in Buenos Aires, Argentina (September 2015), “The Berlin Landwehrkanal: Public Participation in an Urban Area” by Andreas Dohms of the Wasser- und Schifffahrtsamt Lauenburg, Germany, described how public participation can result in public support of difficult infrastructure solutions. Unlike the previous case study in Melbourne, the Berlin project had long-term planning, in Berlin the need to act arose suddenly and urgently. Nonetheless, some of the same principles mentioned above applied.

The Berlin Landwehrkanal (LWK) was built in the mid-19th century, planned by the well-known Prussian landscape architect, Peter J. Lenné, who designed other significant gardens and public parks in Berlin. Some 10km long, the Landwehrkanal links the upper Spree River in Berlin-Kreuzberg with its lower section in Charlottenburg. Bound by two locks and crossed by 37 bridges, the canal runs through a densely-populated inner-city with one and a half million people in the vicinity.

Originally used for freight transport, the canal is nowadays important for recreational navigation and passenger boats for tourism. The “Bridge Tours” are booked by more than one million passengers per year. Residents also enjoy the canal and its banks are bordered by green recreational areas that create flora and fauna biotopes, raising their ecological value. The canal is protected as a historical monument.

The collapse

In the spring of 2007, a few bank collapses along two stretches of the Landwehrkanal occurred. To prevent further damage, the
The groups worked as volunteers with the waterway administration specialists, examining the technical proposals and in some cases optimising them. This complex approach with full involvement of stakeholders ensured transparency both while developing solutions as well as while implementing them.

Asking the public to participate helped smooth the way to gaining public acceptance and support for the Berlin Landwehrkanal restoration. This example again proves that although interests may conflict and problems are complex – and even urgent – taking the time to invite public participation can expedite the project and help find solutions acceptable to all parties (Figure 5).

OTHER EXAMPLES OF PRO-ACTIVE CONTRACTOR COMMUNICATION

Not every project is large and not every project portends immediate disaster. Yet all projects impact nearby populations and situations.

Federal Waterway Administration, represented by the Wasser- und Schifffahrtsamt (WSA) Berlin, which is responsible for operating and maintaining the Federal waterways in and around Berlin, secured the sites by locking them up, stabilising the collapsed banks and cutting some of the trees along the embankment. The intention of removing another 200 trees along the canal was announced. Protests against further tree removals, organised by newly founded action and environmental groups, arose immediately (Figure 4).

In the view of the WSA Berlin, the situation was urgent and further bank collapses along the entire length of the canal were an imminent danger. Consequently, the announced tree removals began in July 2007 – carried out under police protection. This is clearly not how one wishes to work. As public opposition increased, the tree removal became a political hot potato and more action groups were founded. Perhaps, ironically, the state and district authorities of Berlin and from all political parties supported the protest groups, leaving the WSA Berlin isolated.

“Future of Landwehrkanal”

A new format for negotiating between the WSA Berlin and the public about the canal’s renovation was as urgent as the need for tree removal. Other public concerns were also looming. Finding – and explaining – technical solutions acceptable to all sides had to be a priority. Eventually, the idea of a mediation procedure, named “Future of Landwehrkanal”, emerged. Although a wide variety of participants such as environmentalists, historians, small ship groups were involved in the mediation process, one issue overrode everything else – people wanted to participate in the project’s decision-making procedure. The conflict was not just about the WSA Berlin’s actions that had been carried out before the start of the mediation. The real problem was the exclusion of the public up to this moment.

Once again the events at Berlin’s Landwehrkanal proved that excluding the public from the decision-making process is not good policy. It denies the public the chance to learn what the problem is, make it their own, express their concerns and offer useful insights. The uniqueness of these citizen’s action groups in Berlin was their commitment to seeking solutions that would be acceptable in terms of ecology and technology, but also as regards to government budget restrictions.
demand that the public be informed. Below are several examples of projects that have improved or will improve the quality of life of residents in the long-term, but were not necessarily self-evident to stakeholders from the start.

**Newbiggin Shoreline Restoration, UK**

After years of economic decline, Newbiggin-by-the-Sea, a town of 7,500 people in Northumberland, on the North Sea coast of England, was scheduled to undergo a revival. A large part of the beach had been washed away leaving the existing sea wall in danger of collapsing. After much deliberation, a major government investment was ready to fund beach replenishment, breakwater construction and a landscaped promenade. This project to restore the once famous beach and sea front back to and beyond its former glory, took place between March and October 2007.

Newbiggin-by-the-Sea had been a thriving mining town as well as a grain port. Over the last several decades these industries had faded, the coastline eroded, and the economic situation of the town worsened. Several government agencies including the Department for the Environment, Fisheries and Rural Affairs and the Wansbeck District Council spent years pushing for and conceiving a plan to breathe new life into the town. With the approval of the funding for the project the dredging works were to commence.

The £10 million project would involve recharging the beach with 500,000 tonnes of new sand; building a new breakwater in the bay to ensure tidal currents do not remove the new sand; improving the promenade, including a new set of feature steps in the centre of the bay; new playground; raised viewing platforms allowing visitors to see over the existing concrete sea defences; and the UK’s first permanent offshore sculpture.

The community, as is often the case, was not convinced. The sand for replenishing the beach had to be collected from far out at sea. Because of the shallow waters near the town, dredging vessels would have to anchor 1.5km off the coast to unload the dredged sand. And the rough coastal waters of the North Sea would probably threaten the sand replenishment or so it was thought by the local population. All these aspects caused concern amongst the residents...

Since dredging operations are often viewed with scepticism, the contractor made every effort to cooperate with the community, to provide information that made it clear to the residents what was being done and why. This included:

- Several dedicated websites were created with photographic and video information. They provided updates on the progress of all aspects of the project, with contributions from the people who live and work in the village. On one of the websites, the route of the TSHD Oranje, could be followed as she hauled sand for the beach replenishment. This was a 9-hour journey, which is quite long, as the sand was won from a licensed dredging area off the coast of Lincolnshire, near Skegness. The whole cycle, sailing back and forth and collecting the sand and delivering it, cost 22 hours, almost a full day. The website had more than a million hits with visitors as far away as Australia.
- A viewing platform was put in place to enable local residents to watch the progress. In this way, the public could observe first-hand the dredging operations and breakwater construction as they came into view. This proved an exciting event, and many people came out to watch the Oranje at various times during the day and night.
- Deploying the TSHD Oranje with its capacity of 15,850m³ and loaded sailing speed of over 15 knots made the whole enterprise more cost-efficient. It enabled large quantities of sand to be transported efficiently over a long distance so that fewer trips were needed. The deployment of the Oranje also meant that dropping
anchor a long way offshore was not a problem, because the ship was able to pump the sand ashore through a 180m flexible floating pipeline and a 1,500m sinker line.

- The contractor also addressed the residents’ deep concerns about future erosion. A protective breakwater was created by laying 50,000 tonnes of rock on a geotextile mat on the seabed. The structure was provided with a protective layer of ‘Core-locs’ – interlocking concrete blocks which are able to absorb and dissipate more wave energy than a natural stone structure.

Now some eight years later, the town’s shoreline is a welcomed attraction for both residents and tourists, regaining its economic vitality. The importance of the public’s awareness of the project’s progress avoided conflicts and created instead new opportunities.

**IJsselmeer Lake Friesland, the Netherlands**

As a result of the Intergovernmental Panel on Climate Change (IPCC) reports on climate change, the Netherlands government commissioned a study into the question of whether the current national water and flood protection systems are sufficiently robust for the next 100 years (Delta Commission 2008). The study concluded that one must prepare for a maximum sea-level rise of 1.3m in the next century. It also found that as fresh water needs are expected to increase in the future, the reservoir function of the IJsselmeer Lake had to be reinforced. These conclusions were accepted by the Netherlands government as a sustainable, forward-looking strategy and it developed a plan to prevent flooding and improve the lake’s function as a reservoir.

The communities along the lake were far less happy. They saw the government plan as possibly destroying their livelihoods and the historical towns along the shores of the lake. Faced with these conflicts, the Building with Nature (BwN) programme was asked by the national government to initiate a pilot study along the Frisian coast. Representatives of BwN approached the Frisian governments to seek collaboration. The BwN programme is carried out by EcoShape, a consortium that includes myriad stakeholders such as dredging contractors, engineering consultants, government agencies, municipalities, applied research institutes, universities and academic research institutes.

The struggle for coastal protection in the Netherlands is a never a surprise and innovative methods and technologies are always a priority. Consequently, when a pilot project for sand nourishment was suggested for the IJsselmeer coast in the North of the Netherlands, this was for dredging contractors a continuation of a long history of battling the seas.

For the residents along the IJsselmeer coast, it was also a long story, but not a positive one. A formal protest letter was presented asking that the consortium be denied work permits. They had witnessed too many failed interventions – old sand shoals, failed nourishments and breakwaters claimed by the waves. Another failure would risk their livelihoods, as recreational boating, swimming and surfing could be destroyed. For the national government and the BwN researchers and engineers, doing nothing was not an option for the long-term. Facing staunch opposition, a public relations crisis was brewing and community participation was imperative.

Slowly it became apparent that regional parties were willing to talk but were diametrically opposed to the plans of the national government. Local communities saw the urgency to join in the policy and political deliberations about the lake, but their aim was to stop the project. The BwN representatives sought support among Frisian officials and local experts, but without a regional coalition of authorities and decision-makers in favour of the idea the regional authorities hesitated to become active advocates for the BwN plan. Unable to get support from local civil servants who were wary of a looming conflict with national authorities, the initiator of the BwN pilots reconsidered strategies and sought a coalition that would signal the need for change at a convincingly influential level. The deputy of the Province of Friesland, the chair of the Water Board and the director of an NGO were approached.

Together they decided to make a video of this group philosophising about the potential role of BwN and post it on YouTube. The video turned out to be an important motivating factor during encounters, showing that political superiors were in favour of the BwN experiment. This gave the project some legitimacy in the eyes of experts and policy makers – it gave BwN the opportunity to reach out to others in the community and to start a deliberation process with stakeholders.
It is never easy to translate innovative ideas into policy. Most people are not thinking about the future and what can be achieved by innovation. They are thinking about the here and now. One lesson learnt in the case of “building with nature” was that solutions should be linked to existing problems already acknowledged by stakeholders, who may then consider connecting their resources to the new initiative. Furthermore, this process should start as soon as possible and be carried out on a continuous basis, as the sands so to speak are constantly shifting.

The development of regional plans often occurs on multiple scales of governance, hence the client and contractor have to act on multiple playing fields almost simultaneously. Local arenas and local decision-making are important but the threat of getting trapped in short-term interests and local political dealing is a real possibility. A combination of top-down and bottom-up communication is probably most effective, certainly in situations where innovative policies are trying to win acceptance.

METHODS FOR PUBLIC PARTICIPATION

No one size fits all, but a few basic guidelines do give impetus for further thought and action. In 2002, the US EPA (Environmental Protection Agency) was confronted with the difficult task of ‘selling’ the idea of cleaning up the Hudson River in New York State. The presence of PCBs from prior industrial activities led the government to a decision to name the river a SuperFund Site. It was determined that removing this toxicity was imperative. Opposition to this clean-up action was widespread, promoted by the company that was one of the major polluters of the river. This opposition went on for years. To communicate the urgency of removing the contaminated sediments, a neutral team of public participation professionals was contracted by the EPA. More than 144 Hudson River Valley community members were interviewed regarding how the public should be meaningfully involved in the design and implementation of the Hudson River PCBs dredging project.

Out of the many questions, concerns,
opinions and reactions expressed by this diverse group of individuals, a list of anticipated impacts from the dredging project, the public’s expectations for participation on the design and implementation of the project and opinions concerning past public involvement were identified. These viewpoints resulted in a report, Hudson River PCBs (2002), suggesting recommendations about further communications for pro-active public participation.

A similar environmental clean up challenge occurred at a SuperFund site on the Passaic River in New Jersey (Figures 7a and 7b).

LESSONS LEARNT FROM VARIOUS PROJECTS

By reviewing the above projects, a series of basic “best practices” for public participation emerges for clients and contractors. These are applicable to a wide variety of dredging and maritime infrastructure projects. These are applicable to a wide variety of dredging and maritime infrastructure projects be they in ports along coastlines, in industrialised nations or emerging economies (Figure 8). Whilst this list may not be complete, here are 12 best practices for increasing public awareness and participation:

1. Engage with stakeholders as early as possible in the process by, for instance, creating a stakeholder advisory committee.
2. Recognise that public participation must be included in the decision-making process in order for the outcomes to be viewed as legitimate.
3. Be aware of the multiple scales of governance and consider a combination of top-down and bottom-up approaches.
4. Do not presume that the public has prior knowledge. Therefore, keep the process transparent – all aspects of decision-making for the project should be visible and understandable to all stakeholders.
5. Make the process meaningful – focus the attention on tasks and issues where public input can have significant influence on decisions. Give participants clear roles and responsibilities.
6. Acknowledge the public’s input so that stakeholders feel that their opinions are valued. A community information session, where a dialogue takes place, is preferable to a “public meeting” where only project proponents get to speak.
7. Support the public’s deliberations with regular, accurate and timely information.

Figure 8. Community projects are welcomed by the local population and have a positive effect on both the project execution as well as general living standards of those living along the river where dredging was taking place.
and provide regular feedback from the governing authority.
8. Respond ASAP to public feelings – positive and negative.
9. Recognise that stakeholders do have reasonable concerns.
10. Recognise that stakeholders do have information that can contribute to improvements in the dredging programme.
11. Be flexible in responding to changing conditions and situations.
12. The process of community participation carries a price-tag. Allocate moneys for this process if it is to be carried out in a useful way.

**SPECIFIC COMMUNICATIONS ACTIONS**

Depending on the situation, many communication tools are available:
- Stakeholders appreciate the opportunity to meet the experts including the dredging contractor and to ask questions. As mentioned above, meetings where a dialogue between experts and the community can take place is much better than meetings where only the experts speak.
- Regular presentations and briefings with community liaisons will help keep the public updated and can avoid unwanted surprises on both sides.
- Print and electronic newsletters can be used to keep various groups informed of the project’s developments.
- Programmes for schoolchildren, when viable, can be organised to teach the next generation more about the port, waterway and other water-related issues thus planting the seeds for future cooperation.
- Television / radio / print advertising campaigns and press releases cost time and money but are well worth the investment to help explain why a project is beneficial for the community and the economy.
- Establishing a dedicated website and toll-free telephone information line is a sign of transparency and cooperation.

All these measures contribute to keeping the lines of communication open between client, contractor and community. They can help avoid confrontations and lead instead to cooperation.

### CONCLUSIONS

Inclusiveness when planning a maritime infrastructure project regardless of whether it is a major development or a smaller operation is a must. All stakeholders, including the public, have a right to transparency and to know what is happening in their neighbourhood. Economic considerations that lead ports to plan expansions or for waterfront protection or coastal replenishment as well as contaminated sediment remediation projects need to be explained from a social-environmental viewpoint as well.

When people are informed, they feel recognised. They feel ownership. And they then react differently. Rather than protesting, they can think along. Local residents may actually shed light on important issues that perhaps have been overlooked by project developers.

Utilising a system for public participation should be part of the project planning and should occur at the start of a proposed project and should be ongoing every step of the way. Funds for this research should be budgeted and the value of the public’s opinion must be recognised in all aspects of the infrastructure project.

The public has to trust that the authorities and the dredging contractor have a fundamental belief that the public has the right to know. To create this trust, the experts must accept that the process of creating awareness must be initiated by the contractor and client. However, given that dredgers are engineers and technicians – not public relations specialists – they may lack effective communication skills. To achieve a true exchange of information may require specialised training to improve these skills or employing outside agents that are versed in public policy and communications.

### REFERENCES


The updated report, “Classification of soils and rocks for the maritime dredging process” is divided into seven chapters. The introduction (Chapter 1) highlights the objectives and scope of the report, a list of definitions of various materials (soil, rock, sediments and intermediate additional materials) and a framework of the rest of the document.

Chapter 2 shows an overview of various ground investigation techniques such as hydrographic and geophysical techniques, boreholes, in-situ geotechnical tests and laboratory tests. It also includes the evaluation of site investigation data and reporting.

Chapters 3 and 4 give detailed information on soil and rock characteristics while Chapter 5 covers the topic of intermediate material or sometimes known as ‘hard soil-soft rock’. The three chapters also highlight references for readers for additional information. Through the detailed classification of materials, the report aims to show on how to provide adequate qualitative detail (description) and quantitative detail (test results) in order to make a reasonable estimate of the dredgeability of the material, its behaviour during loading and transport and its suitability for re-use.

Chapter 6 describes the dredging processes – dredging, transport, loading, re-use and disposal – related to soil or rock properties.

The final chapter (Chapter 7) provides information on how to apply the classification for a complete maritime dredging process. The chapter also includes separate tables for various dredging processes – excavation, transport, unloading and re-use.

For more information:
www.pianc.org or http://www.pianc.org/technicalreportsbrowseall.php

BOOKS / PERIODICALS REVIEWED

CLASSIFICATION OF SOILS AND ROCKS FOR THE MARITIME DREDGING PROCESS
BY MARCOM WORKING GROUP 144.
Published by PIANC/ The World Association for Waterborne Transport Infrastructure. 2016. € 160. 139 pp.

The MarCom Working Group 144 was established by PIANC in November 2009 to review the previous classifications of soils and rocks for maritime dredging process and produce an updated document. The last PIANC classification was issued in 1984.

The updated report, “Classification of soils and rocks for the maritime dredging process” is divided into seven chapters. The introduction (Chapter 1) highlights the objectives and scope of the report, a list of definitions of various materials (soil, rock, sediments and intermediate additional materials) and a framework of the rest of the document.

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For more information:
www.pianc.org or http://www.pianc.org/technicalreportsbrowseall.php

THE ECOLOGICAL EFFECTS OF DEEP SAND EXTRACTION ON THE DUTCH CONTINENTAL SHELF
BY MAARTEN DE JONG
Published by Wageningen University, the Netherlands. 2016. 164 pp. With full-colour illustrations.

On the Dutch continental shelf, approximately 26 million m³ of marine sand is extracted each year and this might increase up to 40 to 85 million m³ to counteract the rise in sea-level.

The Maasvlakte 2 (MV2) project, a seaward harbour extension of the Port of Rotterdam in the Netherlands utilised 220 million m³ of sand. The Dutch authorities permitted sand extraction of up to 20 metres below the seabed instead of the usual two metres to decrease the surface area of direct impact.

The Ecological Effects of Deep Sand Extraction on the Dutch Continental Shelf is a thesis written by Maarten de Jong as part of his Building with Nature (BwN) PhD project conducted at Wageningen University and IMARES (Institute for Marine Resources & Ecosystem Studies). The aim of the project was to study the effects of deep sand extraction (20 metres) and ecological landscaping and to compare these with the effects of sand extraction with shallow and intermediate extraction depths. The data on ecological effects were used to formulate optimisations and design rules for future sand extraction.

The thesis delves into significant changes in faunal species composition and sediment characteristics that were observed in the deep areas of the MV2 borrow pit. It shows that biomass of macrozoobenthos, organisms living in and on the seabed, increased 7-12 fold compared to reference values and the biomass of demersal fish (fish living close to the floor of the sea or a lake) increased 20-fold. Macrozoobenthos and demersal fish are strongly correlated with sediment and hydrographic characteristics and time after cessation of sand extraction.

Ecosystem-Based Design (EDB) rules are also highlighted in the study. Ecological and bed shear stress data were combined and transformed into EDB rules that can be used in the design phases of future borrow pits in order to simultaneously maximise the sand yield and decrease the surface area of direct impact.

For more information:
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DYNAMIC ANALYSIS AND DESIGN OF OFFSHORE STRUCTURES
BY SRINIVASAN CHANDRASEKARAN

Dynamic Analysis and Design of Offshore Structures delves into the different types of offshore platform geometries. The book covers advanced topics on recent research on structural dynamics, an essential part of offshore engineering, and can be used as classroom material. It is also aimed at practicing and consulting offshore structural engineers and researchers working in the field. The book presents an overall idea on various types of offshore plants, basic engineering requirements, fundamentals of structural dynamics and their applications to preliminary design. The book also includes links to websites that show video lectures of relevant courses related to the topic.

The book is divided into seven chapters – Chapter 1 describes the various types of offshore platforms to readers. Chapter 2 discusses environmental forces – the different environmental loads such as wind, wave, current and ice and snow, encountered by the structures. The next chapter gives detailed information of the fundamentals of structural dynamics while Chapter 4 describes damping in offshore structures and highlights various damping models such as Rayleigh Damping and Caughey Damping.

Chapter 5 discusses hydrodynamic response of perforated offshore members and this is especially useful knowledge for retrofitting offshore structures. The book also has a dedicated chapter (Chapter 6) on stochastic dynamics, an advanced research topic that extends the basic concepts of structural dynamics.

The final chapter delves into the applications in preliminary analysis and design – it gives detailed information on experimental studies, analytical studies and empirical prediction.

The book gives illustrative examples and exercises to explain basic concepts of structural dynamics. In addition, recent research in the field that has been validated by experimental and numerical studies are also presented in the book. Also, each chapter includes tutorials and exercise for self-learning.

For more information:
www.springer.com/shop

ONLINE AND INTERACTIVE: FACTS ABOUT DRILLING & BLASTING

Underwater drilling and blasting operations are done for a range of projects such as deepening of harbours and channels, excavation of trenches for installing oil and gas pipelines and communication cables, demolition work and excavation for foundations (civil engineering).

The latest Facts About discusses in detail on how drilling and blasting is conducted underwater. Various types of drilling pontoons (a floating pontoon and a drilling pontoon on spuds), drilling systems (a traditional top hammer drill, down-the-hole [DTH] hammer and rotary drill) that are utilised for underwater drilling are described.

Different types of blasting are also conducted for various purposes. Trench blasting is a common method – trenches are excavated for installing oil, gas, water, sewage pipelines and cables. Line drilling technique involves drilling a series of holes that are spaced only several inches apart on the desired line of breakage in the rock. This technique is used, for an instance, to protect and prevent damage to the rock mass behind the (excavation) line which may be supporting a quay wall.

Facts About Drilling & Blasting also highlights the different types of explosives used in underwater blasting and the essential components for blasting. The impacts of underwater drilling and blasting and ways to mitigate them are also discussed in the document.

Facts About is a series of concise, easy-to-read online brochures which give an effective overview of essential facts about specific dredging and maritime construction subjects. Each brochure provides a ‘management summary’ for stakeholders seeking basic knowledge of a particular issue. These brochures are part of the IADC’s on-going efforts to support clients, consultants and others in understanding the fundamental principles of dredging and maritime construction.

To download Facts About or subscribe:
The management of dredged sediments is a significant issue. The 5th International Symposium on Sediment Management (I2SM) will be held in Montréal, Québec, Canada to discuss relevant topics regarding sediment management. The symposium is being organised by Université de Sherbrooke and the École des Mines de Douai.

The symposium aims to bring together academics, professional figures and public agencies involved in sediment issues. The event will consist of a plenary session followed by parallel sessions. The topics that will be discussed include emerging pollutants in sediments, sediment and contaminant fate and transport, ecological impact assessment and risk, remediation of contaminated sediments and beneficial reuse of sediments such as in civil engineering, environmental restoration, products manufacturing.

The previous symposia of sediment management were held in Lille, France in 2008; in Casablanca, Morocco in 2010; in Alibaug, India in 2012; and Ferrara, Italy in 2014.

For more information:
Email: i2sm2016@usherbrooke.ca
Website: http://www.i2sm.ca/

THE SAND MOTOR CONFERENCE: FIVE YEARS OF BUILDING WITH NATURE
SEPTEMBER 14-15, 2016
KURHAUS, SCHEVENINGEN AND KIJKDUIN, THE NETHERLANDS

Every year, the sea takes sand from the Dutch coast. Every five years, the Dutch Ministry for Infrastructure and Environment (Rijkswaterstaat) replenishes the shortfall by depositing sand on the beaches and in the offshore area. To protect the coast in more sustainable and natural ways, the Sand Motor or otherwise known as the Sand Engine pilot project was conceived. The Sand Motor is a peninsula on the coast near Ter Heijde.

The Sand Motor is a knowledge development project involving government, business, research institutes and non-profit organisations (NGOs). If the project fulfils expectations, sand replenishment off the Delfland Coast will be unnecessary for the next 20 years.

The initial research results from the Sand Motor, five years after its creation, will be presented during the two-day international conference. The conference will also showcase talks by researchers, interviews, an exhibition market, workshops and theme excursions to areas that highlight morphology, nature and leisure development.

For more information:
Email: zandmotor@kustvisiezuidholland.nl
Website: www.dezandmotor.nl

2ND EUROPEAN DREDGING SUMMIT
SEPTEMBER 14-15, 2016
HAMBURG, GERMANY

The 2nd European Dredging Summit “Identifying Project Opportunities, Improving Dredging Practices and Complying with Legislation”, will showcase practical solutions from expert dredging experiences with discussions centred around indispensable dredging strategies for efficient operational management and project success. The two-day conference will consist of a number of informative presentations followed by an interactive Q&A session and panel discussions that will highlight different aspects of dredging. Various essential dredging topics will be discussed in detail at the conference. These topics include:

- Sustainable practices and techniques used by ports to ensure efficiency in dredging operations
- Technology used in sediment profile imaging for monitoring sedimentation in dredging projects
- Solutions to reduce alterations to coastal or estuary morphology that affect coastal and marine habitats and species
- Dealing with underwater noise from dredging machinery in compliance with new regulations
- Dredging project investment – A government perspective
- Information on contract set up to ensure supplier and contractor satisfaction

Other topics will also be discussed at the conference. Highlighting methods to aid in meeting challenges related to port infrastructure development and financing, and will be talked about in detail.

The conference also includes a cocktail reception on the first evening and networking lunches.

For more information, contact:
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http://www.wplgroup.com/vaci/event/dredging-summit-europe/
INTERNATIONAL SYMPOSIUM ON RIVER SEDIMENTATION  
SEPTEMBER 19-22, 2016  
STUTTGART, GERMANY

The 13th International Symposium on River Sedimentation (ISRS 2016) will be held at the Vaihingen campus of the University of Stuttgart, Germany. Held triennially since 1980 under the auspices of the International Research & Training Center on Erosion and Sedimentation (IRTCES), the symposium series provides an important forum for scientists, engineers and policy-makers to share information, exchange ideas and collaborate in the field of erosion and sedimentation processes.

Sediment dynamics in fluvial systems is of high ecological, economic and human-health-related significance worldwide. Appropriate management strategies are needed to limit maintenance costs as well as minimise potential hazards to the aquatic and adjacent environments. Human intervention, ranging from nutrient / pollutant release to physical modifications, has a large impact on sediment quantity and quality and thus on river morphology as well as ecological functioning.

Truly understanding sediment dynamics requires multidisciplinary approaches. But how do we transfer new insights on complex interactions in fine sediments into sustainable management strategies? Can we do more with less?

Participants of the symposium will have the choice between two different one-day technical tours on 21 September.

For more information, contact:  
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Email: isrs2016@iws.uni-stuttgart.de  
Phone: +49 711 685 64777  
http://www.isrs2016.de/

EUROPEAN ECOSYSTEM SERVICES 2016 CONFERENCE  
SEPTEMBER 19-23, 2016  
UNIVERSITY OF ANTWERP, BELGIUM

The European Ecosystem Services 2016 Conference, “Helping nature to help us” focuses on the important role that healthy ecosystems play in supporting human well-being and the protection of nature.

This conference is jointly organised by Ecosystem Services Partnership (ESP), OPERAs, OpenNESS, ECOPLAN, University of Antwerp and several others. The conference is also co-organised and has received funding from the European Commission Seventh Framework Programme. The conference will comprise keynote presentations from experts in the fields of policy, practice and science; a networking day where businesses, practitioners, policymakers and researchers meet and showcase their work; and interactive sessions to demonstrate working examples of ecosystem services and natural capital.

The sessions of the five-day conference are divided into six different themes – Biome sessions; Capacity building / networking sessions; Generic / regional based sessions; Policy and / or business related sessions; Sessions related to projects / processes; and Thematic sessions.

The topics of the sessions include: Nature-based solutions for urban challenges; Conceptual Frameworks on Ecosystem Services for Problem solving; The governance of ecosystem services: Methods to understand, inform development, and support successful implementation; Operationalising the concept of ecosystem services; and Solving practical bottlenecks in ecosystem service mapping.

The conference also features field excursions to several interesting locations to see ecosystem services in action. Attendees can choose from nine different locations to visit; this includes Grote Nete Alluvial Forests and Landdunes, National Park Hoge Kempen, Drowned Land of Saefthinge (estuarine nature reserve) and Zwin (estuarine nature reserve).

For more information:  
www.esconference2016.eu

EGYPT’S PORTS AND WATERWAYS SUMMIT  
SEPTEMBER 20-22, 2016  
INTERCONTINENTAL CITYSTARS CAIRO, EGYPT

Since the New Suez Canal project in 2015 was completed, Egypt is aiming to implement the second phase of its vision for the future: expanding its maritime infrastructure and trade capacity in order to take advantage of its unique global position. Key to the implementation of this vision are a number of projects aimed at developing the country’s maritime trade capacity, namely the Suez Canal Zone (SCZ) project, the development of river transport and the development of the country’s ports and inland logistics facilities to support transshipment and value added services.

The 2016 Egypt Ports and Waterways Summit will serve as a platform to share information about these projects and discuss the myriad issues concerning Egypt’s future such as project finance, logistics, port operations and economics.

The three-day programme will comprise of a panel discussion, presentations on various topics, networking lunches and a site visit. A panel discussion regarding the topic, Enhancing the competitiveness of Egyptian ports, is the highlight of the first day of the summit. The panel will discuss in detail what Egyptian authorities can do to ensure that they remain competitive to international shipping, the projects that are currently underway in Egypt to achieve this goal, and future plans that are in place to ensure the continued prominence of the Egyptian maritime industry.

On 22 September, the last day of the summit, attendees can visit Sokhna. Operated by DP World, Sokhna occupies a key location on the
IADC SEMINAR ON DREDGING AND RECLAMATION
OCTOBER 17-21, 2016
SINGAPORE

Aimed at (future) decision makers and their advisors in governments, port and harbour authorities, off-shore companies and other organisations that have to execute dredging projects, the International Seminar on Dredging and Reclamation has been organised by the International Association of Dredging Companies (IADC) in various locations since 1993.

Often presented in co-operation with local technical universities, the IADC Seminar provides a week-long seminar especially developed for professionals in dredging-related industries. In the past this intensive course has been successfully presented in the Netherlands, Indonesia, Dubai, Argentina, Abu Dhabi, Bahrain and Brazil.

Highlights of the programme
To optimise the chances of a successful completion of a project, stakeholders, from the start, need to fully understand the requirements of a dredging project. The five-day course strives to provide an understanding through lectures and workshops. The in-depth lectures are given by dredging experts from IADC member companies. Some of the subjects covered include:
- overview of the dredging industry and the development of new ports and maintenance of existing ports;
- project phasing (identification, investigation, feasibility studies);
- descriptions of types of dredging equipment;
- site and soil investigations;
- costing of projects and types of contracts such as charter, unit rates, lump sum and risk-sharing assessments
- latest dredging and reclamation techniques including environmental issues

The course also includes an on-site visit to a dredging project being executed in the area to give participants the opportunity to see dredging equipment in action and learn about a dredging operation. There will also be plenty of time to network and interact, especially with a mid-week dinner where participants, lecturers and other IADC member company representatives will attend.

Each participant will receive a set of comprehensive proceedings at the end of the week along with a list of extensive references of relevant literature. Participants who have fully completed the coursework will receive a Certificate of Achievement in recognition. The seminar starts on Monday, 17 October 2016 at 8:45 hours and ends Friday, 21 October 2016 at 17:30 hours.

Costs
The fee for the week-long seminar is € 3,100 (approx. US$3,127). This includes all tuition, seminar proceedings, workshops and a special participants’ dinner. It excludes travel costs and accommodation. Assistance with finding hotel accommodation in Singapore can be given.

For more information, contact:
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15TH WORLD CONFERENCE CITIES AND PORTS “CROSSOVERS”
OCTOBER 5-7, 2016
ROTTERDAM, THE NETHERLANDS

The World Conferences of The Worldwide Network of Port Cities (AIVP) is organised every two years. The conference comprises specific sessions and roundtable discussions. Six different topics will be discussed in detail by experts:
- How can crossovers between cities and ports enhance the circular economy?; How can crossovers between cities and ports stimulate innovative business climate?; How can we use smart technologies for green logistics and industries in port and city?; How can joined urban and port planning facilitate the next economy - flexible frameworks of port and city?; How can crossovers allow the creation of resilient ports cities facing up to the challenges of climate change?; and How can port cities enhance social innovation, develop new skills and raise the profile and image of the port?.

For more information, contact:
AIVP
Phone: +33 2 35 42 78 84
Email: conference@aivp.org

Red Sea near the southern entrance to the Suez Canal providing a convenient location for transhipment and goods heading for Cairo.

For more information:
http://www.egyptportsandwaterways.com/
Through their regional branches or through representatives, members of IADC operate directly at all locations worldwide.