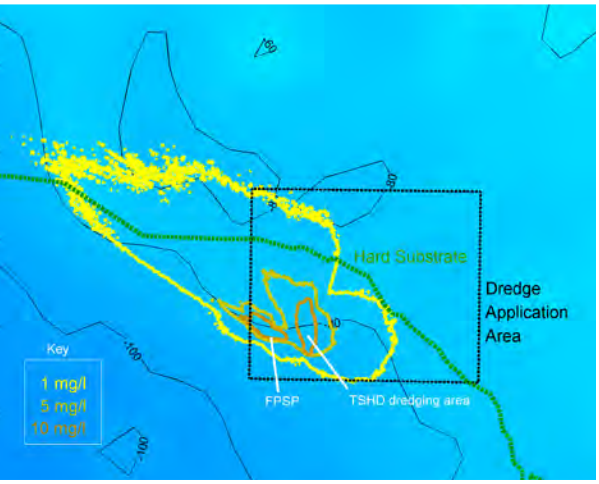
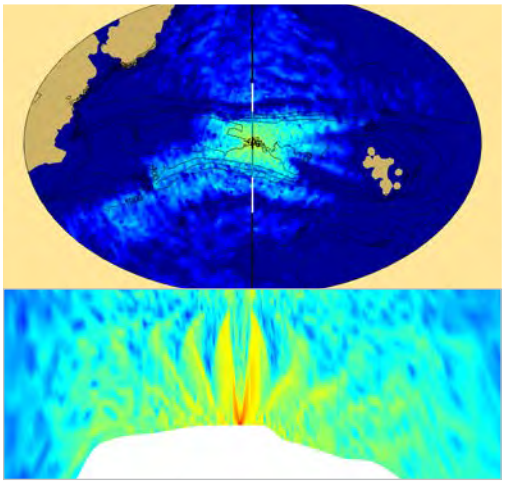
Deep sea minerals exploration and recovery

HR Wallingford can help address the engineering and environmental challenges faced by clients in the deep sea minerals sector, building on our long track record in world class maritime engineering, navigation and hydraulic/ecological studies. We are committed to working with owners, developers, designers and contractors to develop reliable and effective technical solutions based on sound engineering practice. With our active programme of research we can advise on the management of environmental risks stemming from the physical disturbance of the seabed by mineral recovery operations.

Interest is returning to the valuable and rare minerals located on or near the seabed in our oceans. There are however important risks associated with mineral recovery operations in the demanding conditions of deep waters greater than 200m. Existing mineral recovery technologies such as dredging need to be adapted and tested, or new technologies developed, for this challenging environment. Ship movements must be conducted safely, far from shore. Onshore facilities need to be built to process and handle recovered minerals. Owners and designers must address the many stakeholders' expectations of environmental protection during the recovery, processing and transhipment of minerals from the seabed.

Image (left) © Hannes Grobe





Meteorological forecasting and risk

Mineral recovery will occur far from shore and encounter extreme conditions. We supply forecasting and prediction services to prepare the marine engineering sector during their high-risk activities.

- Meteorological and oceanographic investigations
- Operational and extreme environmental conditions
- Extreme weather impacts

Field investigations and data collection

We plan, implement and supervise marine surveys in challenging conditions during the assessment and operational stages of internationally important projects.

- Topographic, bathymetric and hydrological surveys
- Meteorological and oceanographic surveys
- Sediment transportation and morphological analysis
- Sediment release during marine dredging and processing operations

Environmental management

We have state of the art capabilities in the prediction of the physical effects of activities at the seabed; which are fundamental to understanding and managing the ecological risks of mineral recovery operations.

- Sediment plume prediction and management
- Underwater noise and ecological modelling
- Input to Environmental Impact Assessments
- Environmental monitoring

Marine terminal design

We provide the complete package of services to plan and design onshore facilities to handle efficiently and safely the recovered marine minerals.

- Assessment and design of marine terminals
- Computational and physical modelling
- Full-bridge navigation simulation
- Dredging assessment and design

Jeremy Spearman

Technical Director

Current position
Technical Director

Profession
Marine Scientist

Qualifications
- PhD "Estuary Regimes and Methods for Prediction of long-term changes"
- MSc Engineering Hydrology
- MA Mathematics

Nationality
British

Areas of expertise and research
- Sediment transport processes
- Research into fine sediment losses from dredging and mining activity
- Plume dispersion modelling for dredging, mining and disposal
- Member of steering for OpenTELEMAC consortium
- Member of steering committee for INTERCOH
- Fellow of IMAREST
- Advisor to UK regulators
- Expert witness for Public enquiry

Selected Publications
Dr Spearman has published more than 70 peer-reviewed publications on sediment transport, estuary geomorphology and the effects of dredging operations.

Dr Jeremy Spearman is a Technical Director with responsibility for both the Coasts & Oceans and Dredging sections of HR Wallingford. Dr Spearman joined HR Wallingford in 1995 and specialises in the sediment transport and morphology of marine waters and in the development and application of dispersion models for mining, dredging and disposal. He has 25 years' experience of project and technical management of large research and consultancy projects and has acted as Expert Witness both internationally and in the UK. Dr Spearman is a fellow of the Institute of Marine Engineering Science and Technology (IMAREST) and a member of the steering committee for the International Conference into Cohesive Sediment (INTERCOH).

Project highlights

Harwich dredging trial, UK (Ongoing)
Harwich Haven Authority, who are responsible for maintenance dredging for the Port of Felixstowe, are seeking to adopt a form of agitation dredging as a more cost effective, and potentially more environmentally beneficial, alternative to the current methodology of maintenance dredging using trailer suction hopper dredger. The change in methodology will require an environmental assessment. To support this assessment HR Wallingford are supporting HHA in the planned October 2020 dredging trial (e.g. developing monitoring specification, etc.) and, as part of the environmental assessment, undertaking modelling to help assess the effectiveness of the proposed methodology as well as the long term effects on the estuary system. Dr Spearman led these studies.

Hinkley Point C sediment disposal, UK (2021)
The Hinkley Point C power station project required dredging to construct the intake heads associated with the power station. This material required consent for disposal and suitable disposal plume dispersion studies to input to the EIA as part of the consent process. Dr Spearman lead these studies which included development of a validated 3D flow model of the Severn Estuary and simulation of the 3D dispersion of the disposal plumes.

Harwich Harbour Approach Channel Deepening, UK (2020)
Harwich Haven Authority are planning to deepen the approach channel and berths associated with the Port of Felixstowe. As part of the studies to support the environmental impact assessment, Dr Spearman was responsible for the technical management of the sediment transport modelling, morphological modelling and plume dispersion modelling to support the application and to identify the dredging requirement and the nature of any impacts on estuary morphology within the estuary and coastal systems. The modelling undertaken has included development of the next generation of morphodynamic modelling capability for Harwich Harbour and the Stour & Orwell Estuaries, incorporating the effects of the sediment recycling which is regularly undertaken in the estuary system.

Phosphate Mining, Namibia (2019-2020)
HR Wallingford were commissioned to assess the effects of a 20-year mining project for phosphate in 250 m of water depth, off the Namibian coast. The assessment included detailed validation of a highly resolved hydrodynamic model and 3D modelling of the dispersion of mining plumes in complex oceanic waters.

Marine E-tech Research Project, Atlantic (2019)
Dr Spearman was Co-investigator for this NERC-funded research project investigating the potential for deep sea mining for rare minerals on Fe-MN crusts on seamounts and the likely ecological impacts of these operations. Dr Spearman carried out ground-breaking measurements of benthic plumes in deep water at 1000 m depth, reproduced these plumes in sophisticated sediment transport models, and used the calibrated models to evaluate the potential effects of mining.

Mesaimeer, Qatar (2019)
Dr Spearman led this project which investigated the potential impacts on local sensitive habitat arising from proposed dredging and side-casting associated with a proposed diffuser placement. In addition, to support the environmental management of the dredging/placement operations, HR Wallingford undertook automatic forecasting of the plume dispersion, taking account of changes in dredging location and type, throughout the dredging period.

Doha Port Redevelopment and forecasting, Qatar (2018-2019)
Dr Spearman led this project which investigated the potential impacts on local sensitive habitat arising from the proposed dredging associated with this redevelopment scheme. In addition, to support the environmental management of the capital dredging operations,

HR Wallingford undertook automatic forecasting of the plume dispersion, taking account of changes in dredging location and type, throughout the dredging period.

Long-term morphodynamic prediction, Asia (2018)
Dr. Spearman was technical leader for this project which undertook decadal morphodynamic predictions to provide design guidance for engineering works associated with coastal protection in an extremely mobile estuarine delta.

Sand Extraction in Lough Neagh, N.Ireland (2016-2018)
Lough Neagh is the largest freshwater lake in the British Isles with international habitat designation. Up to 1.5 million tonnes of sand is extracted from the lough annually. The consortium of sand dredging companies commissioned HR Wallingford to undertake studies to evaluate the impact of dredging as part of an environmental impact assessment. Dr Spearman led these studies and presented its findings at Public Inquiry, which were consented in 2020.

Moheshkhali, Bangladesh (2018)
Dr. Spearman was technical leader for this project which assessed the long term (decadal) effects of construction of an LNG import facility at the mouth of a dynamic tidal inlet.

Kuwait New Refinery (2016)
KNPC is constructing a new world-class grass roots refinery at Mina Az Zawr (Mina Said), Kuwait. Hyundai Engineering & Construction Co Ltd has won the EPC Package #5 marine works contract and commissioned . HR Wallingford in association with MAPES to undertake a variety of detailed design services. The scope of work included wave, flow and sediment transport modelling, navigation simulation, 2D and 3D physical modelling and engineering design. As part of the sediment transport studies, dispersion modelling was undertaken to investigate the effects of capital dredging and reclamation.

Ichthys LNG, Australia (2009 - 2015)
INPEX's Ichthys Development is an LNG export terminal proposed for Darwin Harbour, Northern Territory, Australia. The development will take gas from the Browse basin, via a 900km pipeline to Darwin. HR Wallingford has supported INPEX in relation to the proposed dredging activities required for vessel access to the export facility. These studies include developing dredging methodologies, dredging production rates and cost estimates, modelling of metocean and hydrodynamic conditions, modelling of dredger plume dispersion throughout the operations to identify the potential effects on coral and mangrove, tender evaluation, navigation studies, input to the environmental statement, supervision of the acquisition of environmental data during the dredging, data analysis, and additional support to the client .

Selected Publications

Spearman J R, Taylor J, Crossouard N, Cooper A, Turnbull M, Manning A, Lee M and Murton B (2020) Measurement and modelling of deep sea sediment plumes and implications for deep sea mining, Nature Scientific reports 10 (1), 1-14.

Ramiro-Sánchez B, González-Irusta J M, Henry L, Cleland J, Yeo I, Xavier J R, Carreiro-Silva M, Sampaio I, Spearman J, Victorero L, Messing C G, Kazanidis G, Murray Roberts J and Murton B (2019) Characterization and Mapping of a Deep-Sea Sponge Ground on the Tropic Seamount (Northeast Tropical Atlantic): Implications for Spatial Management in the High Seas, Front. Mar. Sci., 31 May 2019. https://doi.org/10.3389/fmars.2019.00278.

Spearman J (2018) Models and tools, Chapter 7, Dredging for Sustainable Infrastructure, CEDA/IADC, CRC Press.

Taylor J, Crossouard N, Lee M, Spearman J, Murton B (2017) Challenges associated with monitoring physical processes for deep sea mining projects - recent experience from the Marine E-tech project, UMC 2017, Berlin, Germany.

Spearman J (2015) A review of the physical impacts of sediment dispersion from aggregate dredging, Marine Pollution Bulletin, 94: 260-277.

Spearman J (2014) Prediction of the discharge of sediment from trailer dredgers, Journal Maritime Engineering, 167(2): 82-96.

Soulsby R L, Manning A J, Spearman J and Whitehouse R J S (2013) Settling velocity and mass settling flux of flocculated estuarine sediments, Marine Geology, 339: 1-12.

Spearman J, Manning A J and Whitehouse R W (2011), The settling dynamics of flocculating mud:sand mixtures: Part 2 - Numerical modelling, Ocean Dynamics, volume 61, number 2-3, 351-370.

Our experience in monitoring of deep sea mining

HR Wallingford offers a rare combination of internationally significant expertise in conducting marine monitoring and observations, and in undertaking advanced sediment plume modelling. Both aspects of our expertise have been specifically applied to mining in deeper sea conditions.

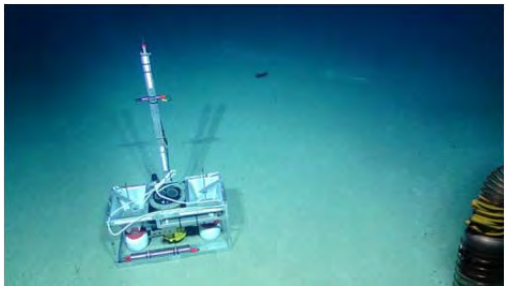


Figure 2: HR Wallingford deep sea lander

Source: HR Wallingford

Recent projects with direct relevance to the present task include:

- Advice to DeepGreen Resources/ NORI on oceanographic monitoring mooring requirements for their deep sea mining project.
- MarineE-tech partnership: a £4.2 million UK Government funded research programme that is investigating the potential environmental impacts that could arise from the extraction of subsea Fe-Mn crusts. HR Wallingford's role included successful field measurements and modelling of sediment plumes in deep sea conditions.
- Phosphate mining, Don Diego, Mexico. HR Wallingford undertook a major programme of underwater sound and sediment plume modelling for the extrication of phosphate from seabed sediments in the eastern Pacific. This included substantial quality review and rectification of baseline survey data.
- Iron Sands Mining, New Zealand, HR Wallingford undertook a review of sediment plume modelling work conducted by a reputable 3rd party, made recommendations on how it could be improved, undertook near-field modelling to provide revised source terms to the 3rd party and led the presentation of the sediment plume modelling work at public inquiry.
- Deep Sea Mining guidance, CEDA. For the Central Dredging Association (CEDA), we have led the preparation of an advisory note the environmental risks and benefits of deep sea mining by dredging techniques.
- Chatham Rock Phosphate, New Zealand. HR Wallingford undertook a review of sediment plume and underwater sound assessments and made recommendations on how they could be improved.

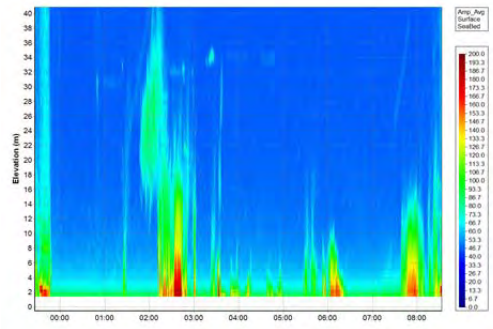


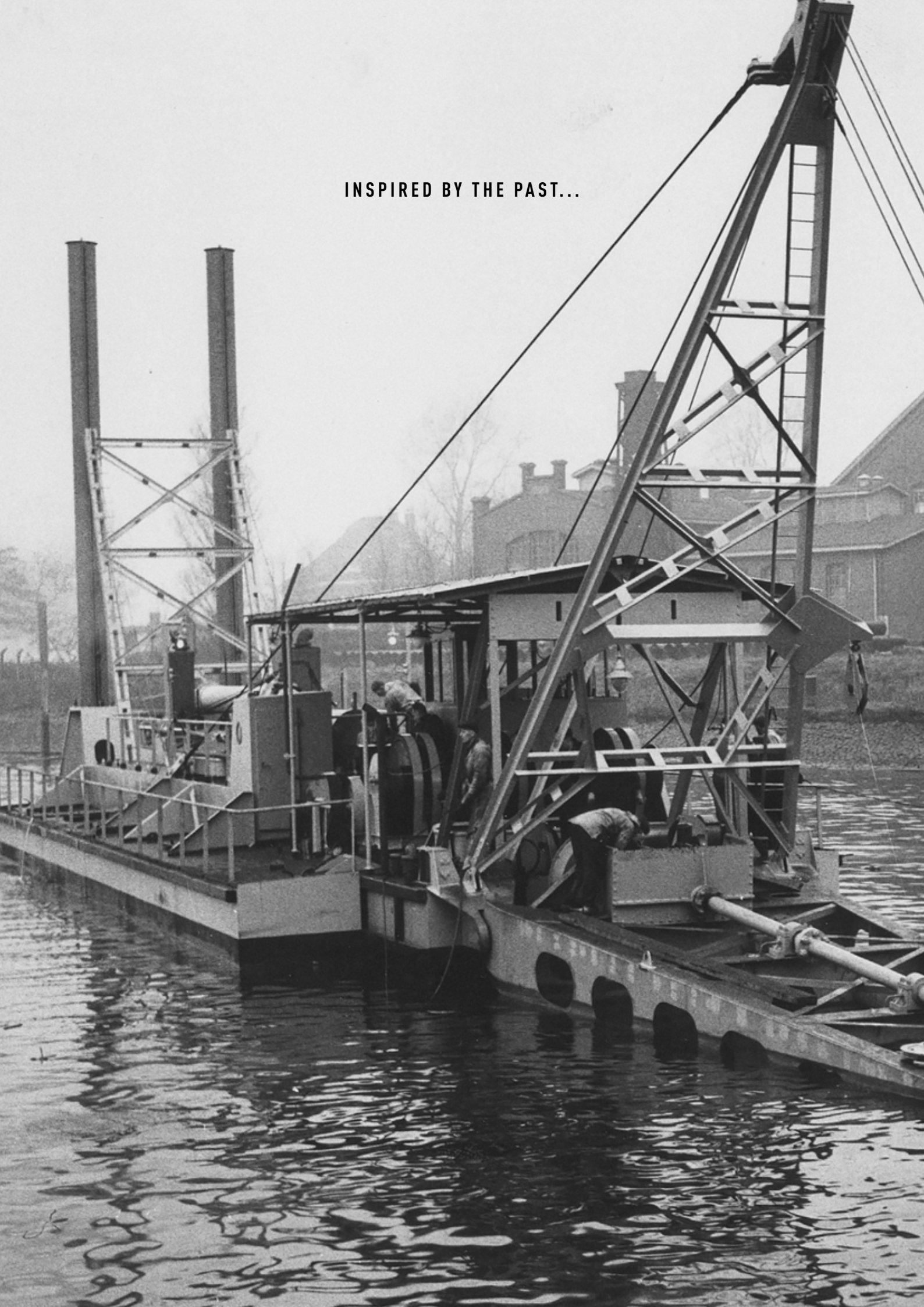
Figure 3: Observations of deep sea sediment plume from extraction tests

Source: HR Wallingford

Capabilities statements for HR Wallingford expertise in deep sea mining, and monitoring of marine projects are given in Appendix A.

JAN DE NUL.

COMPANY PROFILE


INSPIRED BY THE PAST...

DRIVEN BY THE FUTURE...

CONTENT.

6.
SIX GENERATIONS OF ENTREPRENEURSHIP

12.
OUR CARE FOR PEOPLE AND PLANET

20.
OUR INNOVATIVE MINDSET

24.
OUR OVERALL SOLUTIONS
OFFSHORE – MARINE – CIVIL – ENVIRONMENT – PROJECT DEVELOPMENT

SIX GENERATIONS OF ENTREPRENEURSHIP

Jan De Nul Group shapes both water and land. We enable the production of offshore energy and maintain the depth of waterways. We build new ports and create extra land. We realise complex infrastructure works and erect any type of building. We tackle pollution in whatever form. For many generations already, the De Nul family invests in people and in having its own equipment. We have a passion for business but also want to do things our way, which gives us a unique edge within the sector.

A vessel is traditionally baptised by a godmother. In 1986, accompanied by Jan Pieter and Dirk, Julie De Nul baptises her first vessel, the cutter suction dredger Leonardo da Vinci.

FAMILY BUSINESS.

Entrepreneurship runs in the blood of the De Nul family. For six generations already, they invest energetically in a company resolutely going for growth.

For the first dredging assignment Jan Frans Jozef De Nul buys a cutter suction dredger, which he names after his eldest son: Jan Pieter I.

Frans De Nul, pictured here with his grandson Jan Frans Jozef, expanded the joinery business of his father Leo.

GENERATIONS OF JOINERS

Leo De Nul is the first entrepreneur of the family. In 1849, he sets up a business in Aalst as building contractor and 'qualified staircase manufacturer and joiner'. His son, Frans, takes over the business in 1873. In 1914, his sons Isidoor and Gustaaf join the business as well.
After the difficult First World War years, 'Frans De Nul & Zoons' expands its activities. Isidoor and Gustaaf hire extra personnel and continue the family tradition with their 'Mechanical Joinery & Staircase Manufacturing Workshop'.

TRAPPEN &

FRANS DE NUL

AALST,

This invoice from Frans De Nul goes back to 1908.

JAN FRANS JOZEF DE NUL

Jan Frans Jozef, the son of Isidoor, graduates in 1937 as a civil engineer. At the age of 24, he sets up the limited-liability company PVBA Jan De Nul, with the purpose 'to execute all types of public and private works'. The company grows and moves in 1940 to the Tragel site in Aalst. In 1953, Jan De Nul executes its first dredging project for the construction of the highway Brussels – Ostend. For this contract, the company purchases its first cutter suction dredger. The assignments continue to increase and the family invests in the best equipment and expansion of its fleet. In 1968, the company executes its first project abroad in Le Havre in France. The first step to be in the international market has happened.

PIETER JAN & JULIE DE NUL

Julie and Pieter Jan represent the sixth generation of family managers. Julie strongly believes in the power of good personnel. Her focus is on the right man or woman in the right place. She is convinced that the involvement and commitment of employees help the company to fulfil its current pioneering role. She puts her weight behind everything that involves our employees and stimulates their personal growth. Pieter Jan De Nul supervises the international project sites. He closely monitors the operational side of projects and actively contributes to the search for potential clients and challenging projects for the company. The drive to grow and find ground-breaking projects clearly runs in his blood.

JAN PIETER & DIRK DE NUL

In 1978, Jan Pieter, the fifth De Nul generation, assumes control of the family business. In 1981, Dirk joins the board as well. In the nineteen eighties, the two brothers realise their ambition for further expansion of the company's activities, well beyond the European borders. The first offshore oil and gas related contract is won in 1991. Jan De Nul Group confirms its position as a leading global player, taking the lead in dredging works for the construction of the airport Chek Lap Kok (1993) and Palm Island Jebel Ali in Dubai (2002). Activities continue to expand with property development, specialised environmental works and foundation techniques. Thanks to its continuous investment programmes, the company builds an impressive fleet that is ready for the future. With the new generation of installation vessels, the Voltaire and Les Alizés, Jan De Nul Group will continue to play a leading role in the renewables industry.

VISION, MISSION, VALUES.

The vision, mission and values of Jan De Nul Group reflect our innovative, pioneering and socially relevant character. Driven by our widely disseminated corporate philosophy, we work together every day to build a better future. One team, one plan!

Open communication and the sharing of knowledge and expertise are of crucial importance.

VISION

Jan De Nul Group enhances the lives of people, connects communities and improves infrastructure worldwide, through unique and innovative solutions.

MISSION

Jan De Nul Group pushes the boundaries of marine, civil construction and environmental projects worldwide. Working together with our customers, safely and responsibly, we bring experience, methods, motivated teams and in-house designed equipment to IMAGINE what is possible, THINK through the solution and ACT to deliver.

IMAGINE, THINK, ACT

Every employee at Jan De Nul Group works every day according to our ITA philosophy. Good preparation and operational control are key to our success. It is in our nature to work in this way. Quality, safety, improved processes and satisfied stakeholders: these things matter! With a no-nonsense mentality and in cooperation with our clients, partners and subcontractors, we all pursue the same objective.

Imagine: We always keep the aimed at result in mind, weigh risks and opportunities.
Think: We discuss and draw up a detailed plan that we communicate to all parties involved.
Act: When executing a project, we all work towards our final goal. Whenever we see opportunities for improvements or risks, we immediately stop the activities. We consult and adapt our plan.

VALUES

CHALLENGE

Through creativity, a practical approach and continuous innovation we overcome challenges and achieve a better tomorrow.

RESPECT

We care about people and the environment we work in. We create sustainable solutions with the highest level of quality, safety and durability.

CONNECT

We work as one team. With trust and open communication we share our knowledge and expertise both within the company and with partners, subcontractors and clients.

FOCUS

We deliver successful results by focusing on operational control and the best possible solution for all stakeholders. We take initiative, embrace responsibility and exceed expectations.

©Henze Boekhout

OUR CARE FOR PEOPLE AND PLANET

Sustainability is an intrinsic part of Jan De Nul Group's DNA. It is not just another tick in the box. In everything that we do, with whomever we work or wherever we are active, we always strive for the best possible result for people and planet.

In Texel, the Netherlands, we realised a new safety sand dune and an integrated nature reserve. We also included a vantage point to allow people to enjoy the wonderfully upgraded environment optimally.

PEOPLE.

People are the number one priority of Jan De Nul Group. We create a safe work environment in which we stimulate human growth and watch over everyone's wellbeing. We do this through our sports and wellness programme, intensive training courses and a comprehensive safety policy. We strive for these same values in our partnerships with both our clients, partners, suppliers and subcontractors, both locally and internationally.

TRAINING PROGRAMME

Jan De Nul Group cherishes talent and prepares employees for the future and for the challenges that await them. We find it important that our employees continually learn new knowledge and skills. We train and encourage them to think out of the box. Through both internal and external training courses, we create a culture of lifelong learning so that everyone can share his or her knowledge with others across the world.

Our internal training centre, Jan De Nul Academy, offers classroom and digital training programmes for every job.

Through our internal Expert Academy platform, colleagues across the world share experiences gained during the execution of projects.

A wide range of varied FIT activities brings colleagues with different jobs and from different departments together in a relaxed atmosphere. Perfect teambuilding!

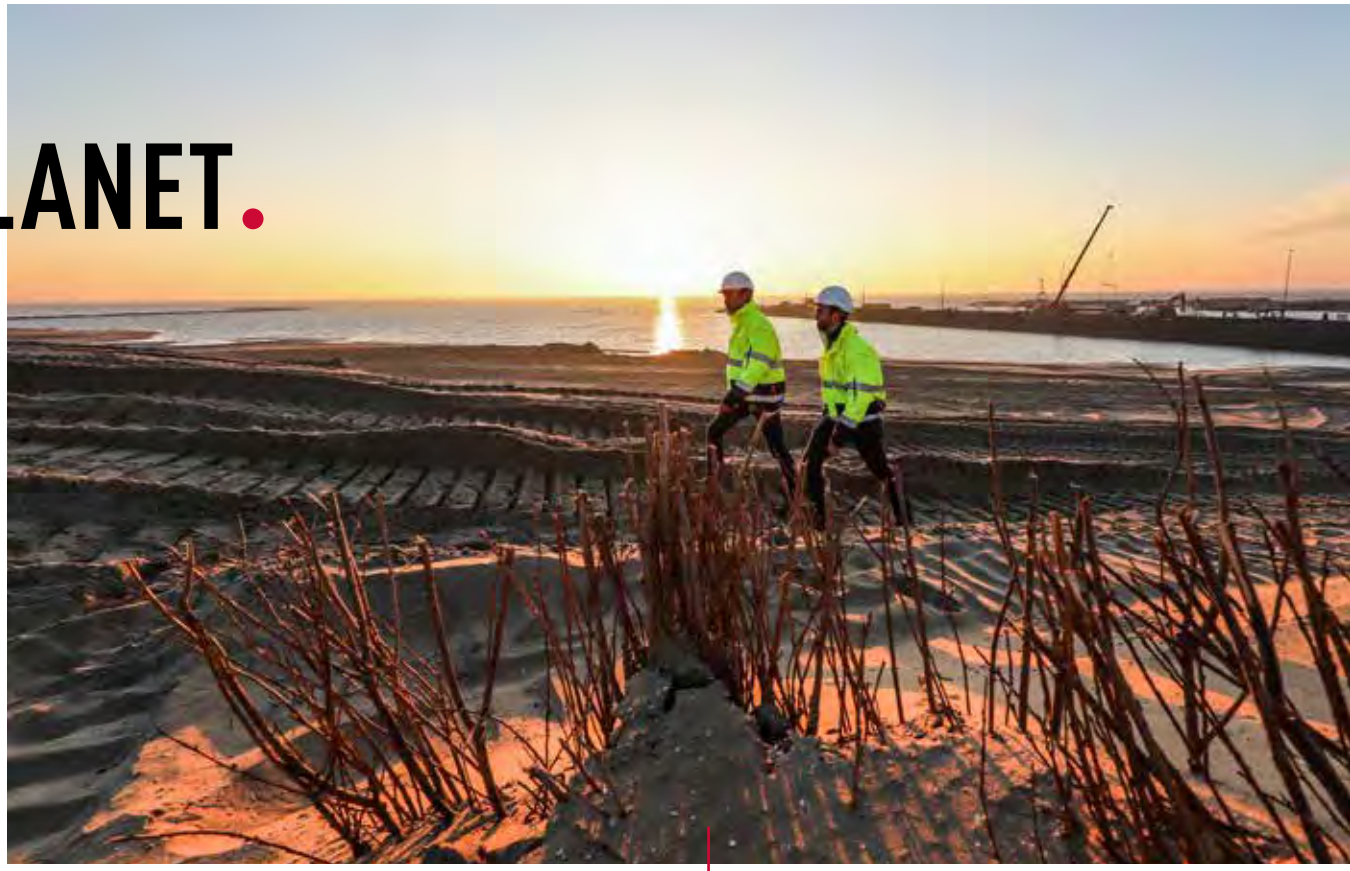
WELLNESS PROGRAMME

Food, In balance, Training and sports. Or, in short, FIT@JDN. With our internal sports and wellness programme, we offer sports and leisure activities as well as a healthy mental balance to all our employees. Whatever their job or the time zone or location in which they are active, we make sure that every employee can enjoy this programme to the maximum extent possible.

SAFETY AND QUALITY

The safety of our personnel and all external workers who are involved in our work is very important to us. Both on board our vessels and on our construction sites, we apply high safety standards. Thoroughly training and continuously retraining our employees in the applicable rules and procedures, we can maintain operational control during high-risk activities. We remain committed to anchor safety and quality even deeper in all our activities because we strongly believe that prevention is always better than the cure.

PLANET.



With our Nature-Based Solutions, we go for integrated building techniques based on and to the benefit of nature. The idea behind these solutions is that nature develops and maintains itself.

Jan De Nul Group works every day on shaping a better planet. During the design and execution of a project, we take well-thought-out measures to minimise our impact on the planet. Through a comprehensive energy management policy, we strongly reduce our energy consumption.

PROJECT DESIGN

Protection of biodiversity is already taken into account in the engineering phase. We follow to the maximum extent possible features and performances of ecosystems. Through these Nature-Based Solutions, we apply construction and remediation techniques that make use of natural materials.

We replace our construction site accommodation by new ecological site offices that consume 80 percent less energy.

PROJECT EXECUTION

By using innovative techniques and by permanently monitoring our activities, we keep the impact on fauna and flora under control. More so, we even reduce this impact.

We strongly dampen the sound waves generated when driving piles into the seabed by using sound-absorbing installation tools and through the simultaneous creation of sound-insulating air bubble screens all around the vessel.

ENERGY MANAGEMENT

Under the name 'Act Green', Jan De Nul lowers its own energy consumption. We closely monitor all energy flows and take active measures to reduce them drastically.

This immediately translates into our day-to-day practice: our new ecological site offices consume 80 percent less energy, we fuel part of our vessels with fully renewable biofuels and we continue to work on the electrification of our vehicle fleet.

SUSTAINABLE BUSINESS.

Through the very nature and geographical distribution of our activities, Jan De Nul Group enters into contact with many different cultures and communities. We stand for honest work and take our corporate social responsibility to heart. To this purpose, we apply the most stringent operating standards and show commitment within the local communities in which we operate.

BUSINESS ETHICS

All our employees have the greatest respect for the community in which they operate. More so, they encourage others to act in an ethically correct way. We expect the same commitment from all parties with which we work together.

In Benin, our project team organised a beach clean-up during which we gathered and disposed of no less than 4.5 tonnes of waste.

STAKEHOLDER COMMITMENT

We work closely together with clients, employees, suppliers and local communities. By including all parties in our sustainable business commitments, we continue to innovate, improve our risk management and increase our sphere of influence.

LOCAL COMMITMENT

We involve the local community in the realisation of our projects. But we do more than that: we provide training and create employment, we support local NGOs and organise local initiatives.

TRISTÃO DA CUNHA

OUR INNOVATIVE MINDSET

Jan De Nul Group is future-proof and permanently works on the world of tomorrow. With our Ultra-Low Emission vessels, we are a ground-breaking pioneer in our sector. But we also share our knowledge beyond the sector to stimulate innovative thinking.

The ULEv vessel Tristão da Cunha is equipped with an ingenious filter system that (almost entirely) eliminates the impact on air pollution. Immediately after its delivery, the vessel set to work in the port of Payra in Bangladesh.

The vessels are equipped with an exhaust gas treatment system and can be recognised by their blue funnel with ULEv logo.

ULTRA-LOW EMISSION VESSELS

Ultra-Low Emission vessels or ULEvs. The new generation of Jan De Nul Group vessels is ready for a sustainable future. The diesel engines of our ULEvs are equipped with exhaust gas treatment systems that are state-of-the-art: a catalyst renders nitrogen oxides harmless whereas a soot filter blocks even the tiniest particles. In this way, we extract up to 99 percent of dust particles from exhaust gases.

The technique is based on filters proven in Swiss tunnels to filter all exhaust gases of vehicles and heavy machinery. Jan De Nul Group succeeded in applying this technology to the shipping industry. A great example of our in-house design capabilities and of our pioneering role within our sector. Jan De Nul Group is the first company in the shipping industry that meets the very strict European emission standards.

INNOVATIVE IN CONCEPT AND EXECUTION

Innovative thinking is anchored in our corporate culture. From the very start of a project, we encourage our employees to search for optimal solutions. If something does not exist yet, we conceive and make it ourselves.
Our Research & Development department studies the market and, based on its findings, launches innovative ideas within the company.

This in-house designed machine digs in cables into the ground in an intertidal area. The earth pressure of the machine is smaller than that of a person so that it can even be deployed in nature reserves.

On the Schelphoek beach, we created four stone reefs that soon became the natural habitat of seaweed and oysters.

SHARING KNOW-HOW

To be able to come up with innovative ideas and solutions, sharing expertise and experience is crucial, both within Jan De Nul Group and beyond. We centralise the experience of our employees across the world and use it as a basis for every new project. We actively share our know-how and insights with educational institutions and (sector) federations worldwide. Interaction with new and refreshing ideas encourages us to think out of the box.

BLAUWE CLUSTER

Jan De Nul Group is a founding member of 'De Blauwe Cluster', a partnership dedicated to the development and promotion of economic activities at sea.

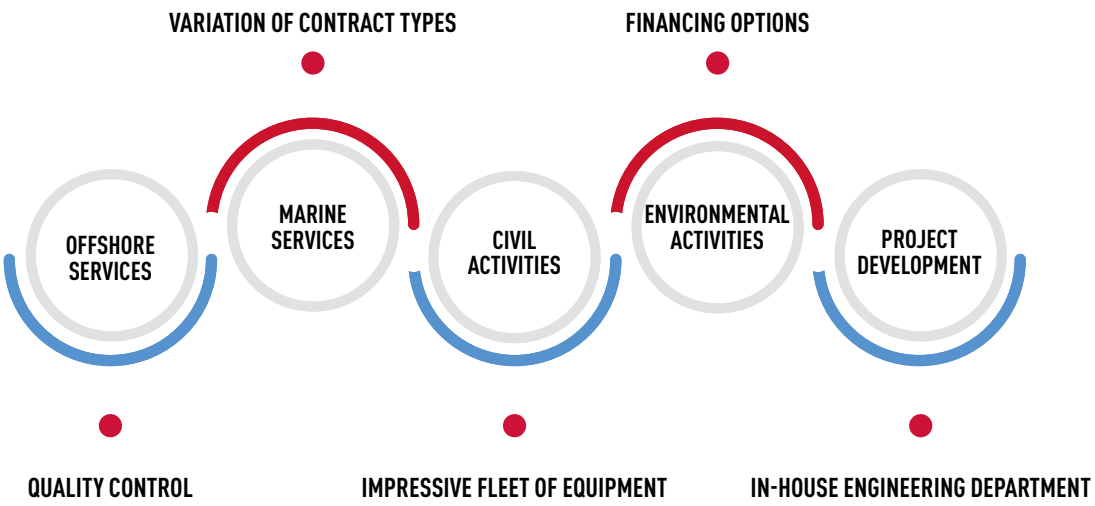
CUSTOMISED OVERALL SOLUTIONS

Offshore, marine, civil, environment or project development. Jan De Nul Group is a leading expert in five main activities. Thanks to the fruitful interaction within our company, we can offer overall solutions that combine one, several or even all these activities.

Jan De Nul Group deepens and widens the Panama Canal, a/o with the cutter suction dredger Niccolò Machiavelli, and helps to build the two large lock complexes. Both complexes, one at the Atlantic and one at the Pacific Ocean, consist of three locks.

FLEXIBILITY.

Jan De Nul Group offers overall solutions for offshore, marine, civil and environmental projects. We can also handle a combination of all these activities. This enables us to combine marine and civil works e.g. when building a new port and, if pollution is involved, environmental works as well. Our engineering department and our impressive fleet of equipment, but also our contract types and financing options turn us into an extremely flexible partner. Our permanent quality control efforts ensure maximum comfort. Our clients can rest assured that their project is in excellent safe hands.



Jan De Nul Group continuously invests in own equipment.

WIDE RANGE OF ROLLING, SAILING AND HEAVY EQUIPMENT

Jan De Nul Group has a very wide range of deployable equipment, a great deal of which has been designed internally. A very diverse fleet of dredging, offshore and rolling equipment ensures that we can offer the ideal mix for realising any project. Our existing equipment needs to be adapted or something is not yet available on the market? No problem. Our in-house engineering department will work out the design itself. We also service and adapt our earthmoving machines ourselves.

Our own joinery workshop and welding shop are engaged to manufacture project- or equipment-specific parts. Jan De Nul Group also runs five valorisation centres in Europe to treat sediments and sludge.

CONTRACT AND FINANCING CONDITIONS

Jan De Nul Group can be an all-in partner for clients. We do more than contracting alone, we act as 'unburdening' partner: from responsibility for the design through quality monitoring of all suppliers and subcontractors up to all-in concession contracts or financing programmes. Jan De Nul Group can offer a comprehensive portfolio for every activity in whatever form.

IN-HOUSE DESIGN

As the only company in our sector, Jan De Nul Group has an in-house multidisciplinary engineering division that can execute and follow up all types of project and equipment design. These in-house engineering capabilities enable us to be an all-in partner for our clients, from well ahead of the start of a project up to its complete execution. It gives us the edge to design tools and installations ourselves.

SIMON STEVIN

OFFSHORE SERVICES

Jan De Nul Group offers specific services for the offshore energy market. Our extensive fleet of installation vessels is used for a variety of activities. We install offshore structures and protect them against erosion. However, we also disconnect and remove them if these structures are at end of life or up for replacement. Through an integrated approach from design to execution, we always ensure a creative overall solution, tailored to the client's specific needs.

The rock installation vessel Simon Stevin dumps rocks around the foundations that were installed by the jack-up vessel Vole au vent.

INSTALLATION OF OFFSHORE STRUCTURES

Thanks to our versatile fleet of offshore installation vessels with lifting capacities from 1,500 to more than 5,000 tonnes, Jan De Nul Group is able to install any offshore structure: from concrete or steel foundations to offshore high-voltage stations and wind turbines.

DISMANTLING AND HOISTING

The installation vessels of Jan De Nul Group are not only perfect for the installation of offshore structures but also for their dismantling and removal. They can handle all types of hoisting operations, including the salvaging of shipwrecks.

The offshore installation vessel Vole au vent installs wind turbines at sea.

ROCK INSTALLATION WORKS

Jan De Nul Group stabilises, reinforces and protects offshore structures with gravel, rocks or concrete mattresses to fight erosion or to prevent the structure from shifting on account of the ocean currents. We also cover pipelines and cables with protective rock layers. The rocks are installed within design margins, often of only a few centimetres using (inclined) fall pipes.

The rock installation vessel Joseph Plateau is being loaded with rocks.

A complete overview of our offshore fleet can be found on www.jandenul.com.

SEABED INTERVENTIONS

Our seabed is filled with dunes, troughs and other irregularities. That is why interventions are necessary when installing offshore structures. To ensure a stable base, the seabed is first 'prepared'. We do this by dredging dunes, levelling the surface and, if needed, placing a first layer of gravel. Pipelines and cables are preferably installed under the seabed. For this, we excavate special trenches that start at sea, may pass across the foreshore and end on land.

The trailing suction hopper dredger Cristóbal Colón dredges excavations on the seabed of the Atlantic Ocean for the installation of production pits along which gas or oil will be won.

INSTALLATION OF CABLES AND UMBILICALS

Jan De Nul Group connects offshore structures and brings offshore energy ashore by installing submarine cables and umbilicals. Specific vessels and tools to bury cables or to cover them with a protective layer assist or are on board our cable-laying vessels.

The cable installation vessel Isaac Newton is equipped with two turning tables that allow continuous loading and installation of very long cables.

ENGINEERING, PROCUREMENT, CONSTRUCTION AND INSTALLATION.

Jan De Nul Group is also the perfect partner for EPCI projects. These projects go way beyond the traditional assignments for installation. We are responsible for integrated project studies and specific strength calculations (engineering) and for the manufacturing of all components, either outsourced to suppliers or made internally (procurement & construction).
In these projects, Jan De Nul Group also assumes full responsibility for the overall quality assurance.

Our engineering division can work out the entire design or part of it.

Jan De Nul Group was responsible for the construction of the Taiwan Power Windfarm Phase 1 Project – Demonstration in Changhua. From the design over the construction of the foundations and their transport up to the installation of the foundations, the onshore and inter array plus export cables, the onshore substation and the wind turbines.

For the offshore wind farm Kriegers Flak, in Denmark, Jan De Nul Group designed and built the concrete foundations for the offshore electrical substations, on a floating pontoon. We were also responsible for transporting and installation.

MARINE SERVICES

The activities of Jan De Nul Group ensure that shipping traffic is possible. We maintain the depth of rivers and canals, expand existing ports and build new ones. By strengthening and extending coastlines, we protect life on land. We offer clients creative and innovative customised solutions and can vouch for their design, execution and maintenance.

The type of vessel is selected depending on the hardness of the seabed. The cutter suction dredger, equipped with cutter head and cutter teeth, is best suited for dredging hard, rocky surfaces.

DREDGING

By dredging waterways such as rivers, access channels, turning basins and harbour docks, these are maintained, deepened or widened for the passage of – large(r) – vessels.

Jan De Nul Group has a fleet of trailing suction hopper dredgers, cutter suction dredgers, split hopper barges and back-hoe dredgers. Depending on the nature of the soil to be dredged and the required draught, the best suited vessels are deployed. When dredging contaminated sediments, Jan De Nul Group can also take on their treatment.

Trailing suction hopper dredger Pedro Alvares Cabral contributed to the further development of the port of Rio Grande in Brazil.

Sand pumped ashore is spread in a controlled way over the area to be reclaimed.

LAND RECLAMATION

Jan De Nul Group creates new beaches and develops new land for residential, recreational or industrial use. Dredging vessels spray the soil ashore using the rainbowing technique or pump it to the shore through a pipeline. We can also use dump trucks for filling up the site.

A complete overview of our dredging fleet and vessels is available on www.jandenul.com.

COASTAL AND SHORE PROTECTION

Jan De Nul Group maintains coastlines by replenishing them with sand after erosion has taken place. But we do more. We install protective structures for vulnerable coastal areas to arm them against rising sea levels. In this way, we can break heavy waves and reduce their impact on the coast. When creating coastal protection structures, we make active use of the ecological function of shores to enrich the fauna and flora.

In Zeeland, the trailing suction hopper dredger Charles Darwin sprays on new sand to replenish the beach.

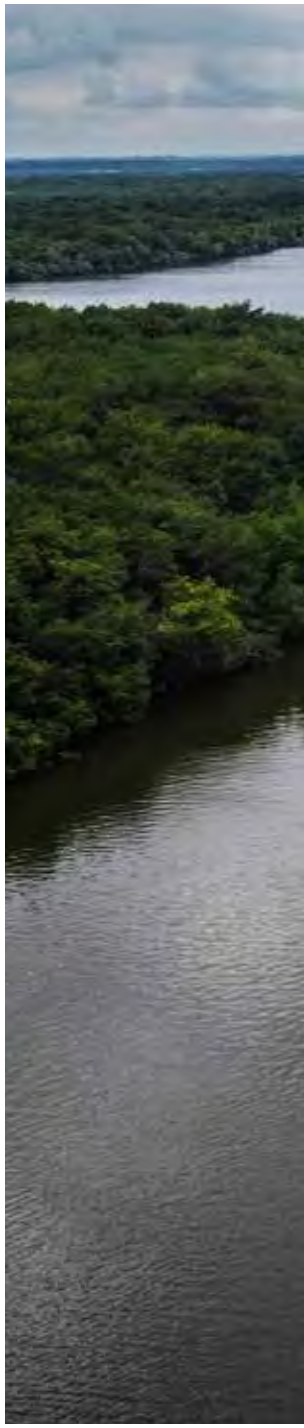
PORT INFRASTRUCTURE WORKS

When constructing new ports, no infrastructure is available yet and we have to start from scratch. We realise access channels, turning basins and berthing docks. We also build terminals or entire port buildings from scratch.

In Ghana, we built the port of Takoradi, which in the subsequent years was also extended by us.

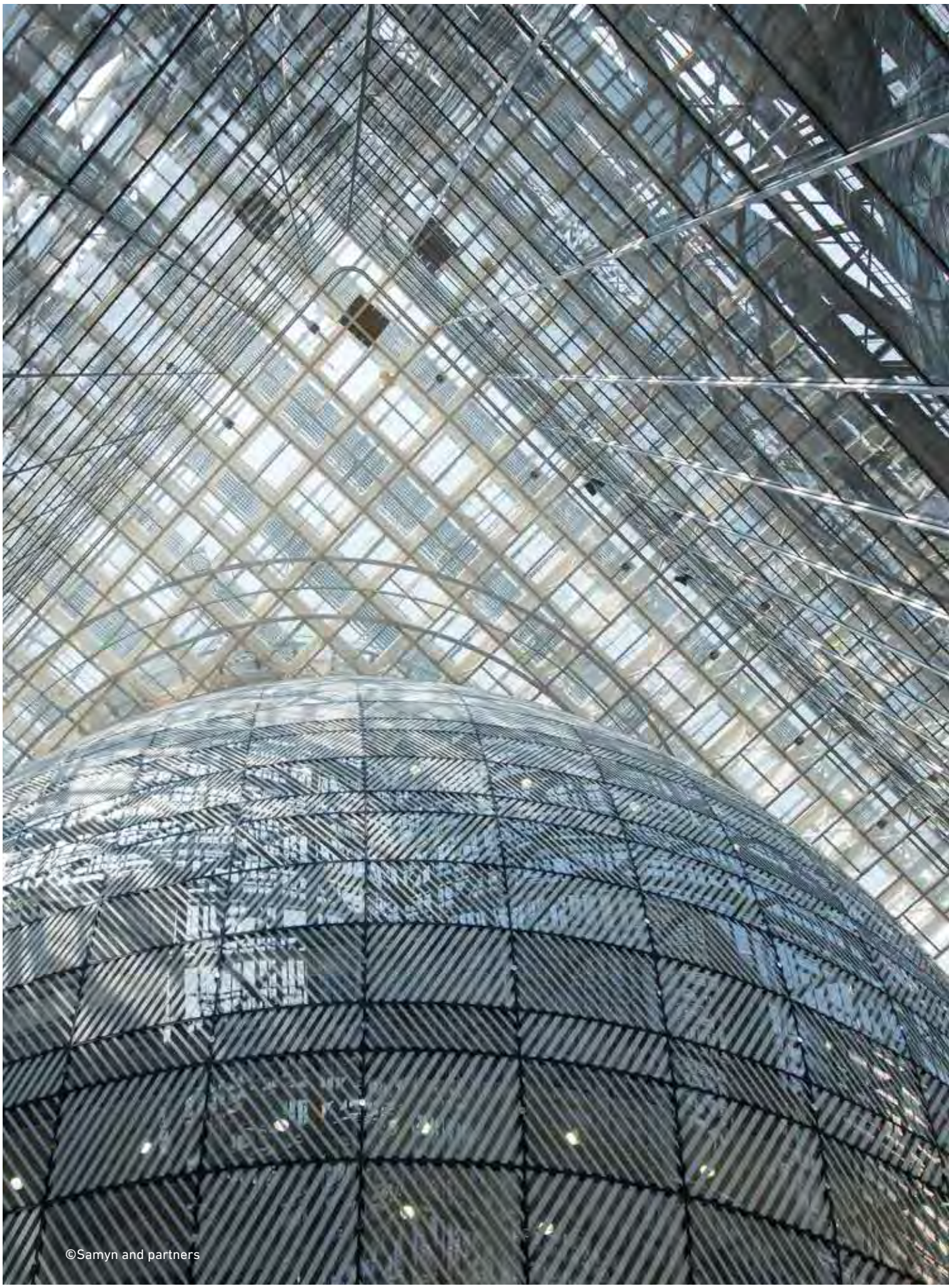
CONCESSIONS.

Jan De Nul Group does more than offering marine services, we also realise large-scale waterway and port infrastructure projects in concession formulas. In this way, the client remains owner but entrusts the whole project to us. Depending on the specific needs, we can take on the financing and actual realisation of the project as well as the operation and maintenance of the structure.



We have a maintenance concession for the Argentine rivers Río Paraná and Río de la Plata. We are responsible for the capital and maintenance dredging works in these rivers for a period of 26 years.

The trailing suction hopper dredger Vitus Bering is one of our dredging vessels that deepened the 95-km access channel to the port of Guayaquil in Ecuador. We are also responsible for the operation and maintenance of the channel under a 25-year concession contract. We finance the costs ourselves and recover them by charging toll.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CIVIL ACTIVITIES

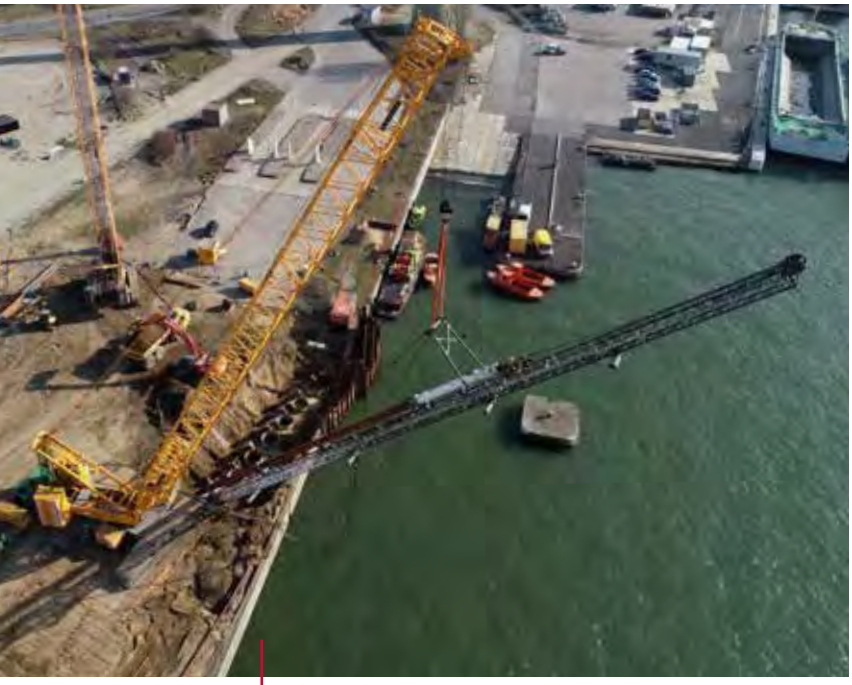
The civil activities of Jan De Nul Group contribute to improving mobility. We realise all types of projects, roads, bridges, tunnels and locks. We are also responsible for the construction of water treatment plants, sewage systems and underground train and subway connections. We use state-of-the-art and eco-friendly techniques for the buildings that we realise. After their delivery, we can ensure their subsequent maintenance.

Jan De Nul Group built the impressive new headquarters of the European Council in Brussels.

BUILDINGS

From rest homes and hospitals to office buildings and residential construction projects, for both private and public clients. When executing building projects, we aim for the integration of ecological and energy-saving technologies, structures and materials and pursue the realisation of circular building concepts.

Jan De Nul Group builds the crematorium Siesegem in Aalst. The building with a surface of over 6,000 m² is an oasis of light. Thanks to our eye for detail and the use of in-situ cast exposed concrete and natural stone, the structure fits seamlessly into the environment.



The execution method with MV piles for anchoring the new quay wall for the canal dock in Antwerp is tailored to the project. By using a 600-tonne crane and a cantilever pile driver guide, the heavy steel anchoring profiles (MV piles) are driven in under a slope from ashore.

FOUNDATION WORKS

Jan De Nul Group ensures a solid foundation for all construction works. Through our subsidiary Soetaert, we can offer all possible foundation techniques, both for buildings and infrastructure works. We use innovative foundation, sheet piling and soil improvement techniques so that on every location and in every subsoil a solution tailored to the specific project can be worked out.

INFRASTRUCTURE WORKS

Transport, pipeline or water treatment infrastructure. Jan De Nul Group can take on the design, construction and maintenance of both existing and new infrastructure. We can do this not only for tunnels and bridges but also for road construction and sewage works.

Jan De Nul Group helped to build the Kieldrecht lock in the port of Antwerp to enable the latter to welcome increasingly large vessels. The lock is huge in many ways: it contains triple the amount of steel as the Eifel tower and is as wide as a highway with 19 traffic lanes.

PUBLIC PRIVATE PARTNERSHIPS.

Jan De Nul Group has extensive experience in Public-Private Partnerships (PPP): a partnership between a public authority and private companies for the realisation of projects. Think of infrastructure works such as roads, bridges or tunnels but also the construction and operation of residential care centres, hospitals and industrial complexes.

DESIGN, BUILD, FINANCE AND MAINTAIN

In a DBFM project, we take on all operational aspects of an infrastructure work: we design and build the infrastructure, arrange financing and are responsible for its maintenance.

Jan De Nul Group helps to address the legacy problem of outdated educational infrastructure in Flanders. Through the PPP 'Scholen van Morgen', Jan De Nul Group builds and maintains 14 nursery, primary and secondary schools.

Jan De Nul Group is co-responsible for the design, construction, financing and 30-year maintenance of the A11 highway between Bruges and Westkapelle. The twelve-kilometre highway and 71 bridges, tunnels and viaducts ensure a much improved link with the port of Zeebrugge. It is the biggest DBFM project ever in Belgium.

ENVIRONMENTAL ACTIVITIES

Historical pollution is a problem sometimes encountered on former industrial or active construction sites or in existing port areas. Jan De Nul Group has comprehensive experience in handling such polluted sites. We remediate on site or excavate the polluted soil and bring it to one of our valorisation centres, always in view of its reuse in alternative applications. As such, we contribute to a circular world.

In Vlassenbroek, we go for a circular economy solution. We valorise dredged, partly contaminated sludge and reuse it for the construction of compartmenting and ring dikes that are part of a flood control area.

WORKS IN PORTS AND PORT AREAS

Jan De Nul Group dredges and treats polluted sediments from ports, canals and waterways. We do this in an ecologically sound way by developing specific hydraulic and mechanical equipment and techniques.

In the Swedish port Oskarshamn, our vessel Pinta dredged polluted sediments to be pumped ashore from the harbour basin. In-house designed and built installations dewater these polluted sediments and treat the extracted polluted water.

Jan De Nul Group has various processing centres to valorise contaminated sediments and sludge. The centre in Toulon can process no less than 160,000 cubic metres per year.

SITE REMEDIATION

Jan De Nul Group remediates and redevelops polluted sites. By combining civil engineering, hydrogeology and environmental technology, we can remediate soils and groundwater in an integrated manner. We not only remediate sites but also ensure their subsequent development.

We are co-owner of Terranova in Zelzate, Belgium. We remediated this former gypsum landfill and redeveloped it into one of the largest solar parks in the Benelux.

Jan De Nul Group helped to remediate the Carcoke site in Brussels. Hundreds of thousands of cubic metres of contaminated soil were excavated and cleaned. The highly contaminated groundwater was also pumped up and purified in treatment plants.

PROJECT DEVELOPMENT

Jan De Nul Group is also active in the remediation, repurposing and sustainable development of polluted industrial sites and un(der)utilised sites. For this, we apply the formula 'Unburdening, Unlocking, Developing'. We take on the complete development track and create space for new destinations, in close cooperation with end users, investors, public authorities and business partners.

We remediated and revitalised the long abandoned and derelict premises of a former gas factory in Lier into a high-quality residential quarter amidst a publically accessible park with ponds.

BROWNFIELD DEVELOPMENT

Population levels are growing. In addition to more and better-suited residential units, we also continue to need space for businesses. This exerts increasing pressure on green space, which is scarce and finite. We will thus have to do more with less space. By developing heavily contaminated or derelict sites, the so-called brownfields, we contribute to decreasing the use of green space. As a pioneer in Belgium, we are committed to eliminating environmental risks in view of the optimal redevelopment of derelict sites. As such, we revitalise long neglected polluted sites such as former factory premises or former landfills in a daring and innovative way.

In Coronmeuse (Liege), we are redeveloping a dilapidated and polluted urban district of +60 acres into an innovative eco-friendly neighbourhood where living, working and relaxing go hand in hand.

In Knokke, we are currently renovating the Albertplein. The project includes the construction of an underground car park and the renovation of the existing utility networks and sewage system but also a completely new design for the aboveground public square.

COMPLEX REDEVELOPMENT PROJECTS

An outmoded town planning destination. Inadequate access or lack of infrastructure, fiscal and legal challenges. Aligning the policy vision of local authorities. Creating public support, but also capturing the concerns of local residents and other stakeholders. All these elements make urban renovation and redevelopment projects very complex. For this reason, sites with promising potential often remain blocked and un(der) utilised for far too long. We make a difference here through our integrated, multidisciplinary approach and stakeholder management. We succeed in unlocking and upgrading such complex sites.

The Inofer site contained a press shop for non-ferrous metals but also a malt-house and a rubber factory have left their marks: environmental pollution that we clean up but also valuable architectural heritage that we renovate and integrate in a sustainable way in an innovative development project combining office space and residential units.

CONVERSION PROJECTS

We revalorise un(der)utilised immovable heritage towards optimal new destinations. We safeguard, integrate and reactivate valuable relicts of our past by giving them a sustainable and active role in the present. We have extensive experience in the conversion of industrial heritage such as warehouses and workshops. However, we are also experts in handling 'other' innovative conversion projects such as vacant hospitals, schools, public buildings or military domains.

On the site of a former cattle feed company in Izegem, we realised a high-quality residential building project with apartments and penthouses on the Roeselaere-Leie canal.

REGULAR REAL ESTATE DEVELOPMENT

The regular or conventional real estate development has stopped being 'easy' a long time ago. Also within this sector, the challenges and complexity have increased considerably. Our commitment when handling large-scale and smaller real estate projects: an optimum spatial integration of the project area in the immediate vicinity, architectural quality, focus on sustainable project development and stakeholder management. We execute both residential, retail, leisure, office and semi-industrial development projects.

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Communication department Jan De Nul Group

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CURRICULUM VITAE

FORDEYN JAN

NATIONALITY	Belgian
BIRTH DATE	24 September 1971
BIRTH PLACE	Eeklo, Belgium

EDUCATION

M. Sc. in Civil Engineering – Naval Architecture, Ghent University, 1994
M. Sc. In Arts and Archaeology, Free University of Brussels (VUB), 2008

KNOWLEDGE OF LANGUAGES

	Mother Tongue	Good	Moderate	Basic
Dutch	x			
French		X		
English		X		
Spanish		X		
German			x	

PROFESSIONAL EXPERIENCE

Since 1 August 1994 working for Jan De Nul Group

Jan. 2021 – present	Office Belgium Director Project Development and Conceptual Design
	– Pre-tender project development by means of early contractor involvement and conceptual design (confidential) – Supervision of tenders and concessions: Vreed en Hoop port (Guyana), Princess Elisabeth Island (Belgium) – Design and technical coordination during project operation: Payra Port – Coordination of JDN scope in joint innovation projects (Vlaio, H2020, TKI, NWO): Eurecca, MUSA, – Stakeholder engagement: UNEP, IADC,
Jan. 2015 – Dec. 2020	Office Belgium Assistant Director Project Development and Conceptual Design
	– Pre-tender project development by means of early contractor involvement and conceptual design (confidential) – Technical coordination of tenders and concessions: Hondsbossche-Pettemer Zeewering (NL-EMVI), Prins Hendrik Zanddijk (NL-EMVI), Roggenplaat (NL-BVP), Payra Port (BD-Concession) – Design and technical coordination during project operation: Prins Hendrik Zanddijk (NL), Dangote (NG) – Coordination of JDN scope in joint innovation projects (Vlaio, H2020, TKI, NWO): Coastbusters (B-Vlaio), MFiland (B-Vlaio), United (H2020)
Sept. 2005 – Dec. 2014	Office Belgium Manager Project Development and Conceptual Design

	In this period a.o. responsible for following projects: – 2006-2011: De Beers & Namdeb, Namibia: Design, prototyping, model testing, calculation and execution of the marine dredging project for diamondiferous sediments – 2006-2007: Deep Sea Mining, Papua New Guinea: Design of equipment to mine SMS at 1500 m water depth (Nautilus Minerals) – 2006-2008: Adriatic LNG, Italy: Design, prototyping, model testing and execution of solid ballast installation of a GBS – 2006-2008: AMORAS, Antwerp: Design of hydraulic system and dredging equipment for a new silt treatment facility for the port of Antwerp
	– 2006-present: Management of 3D visualization team: integration of 3D visualization and animation into design, engineering and method statements of marine construction projects – 2008-2009: Vlaamse Baaien 2100: Long term coastal development plan for the Belgian coast and member of associated governmental work groups. – 2008-2012: Sandpiper, Namibia: Engineering and conceptional design for marine mining of phosphates (NMP). – 2010-2012: Project Manager for MIRT – Zandhonger, Pilot Schelphoek, The Netherlands: Design and Construction of an experimental coastal protection project (with Witteveen + Bos) – 2013-2014: Engineering Manager for Wheatstone Ballast Project: Design, prototyping, model testing and execution of solid ballast installation of a SGS (Chevron)
June 1998 – Sept. 2005	Office Belgium Production Engineer
	In this period a.o. responsible for following projects: – 1999-2005: Design of dredging equipment and hydraulic installation for 6 newbuilt cutter suction dredgers and 13 trailing suction hopper dredgers – 2001-2005: Design of hydraulic system and technical support for supplier of hopper-, cutter-, and engine room-simulator used for in-house training of crew
Sept. 1997 – June 1998	Office Belgium Estimator offshore projects
Dec. 1996 – Aug. 1997	Interconnector Pipeline Project Bacton (UK) – Zeebrugge (Belgium) Project Engineer
Aug. 1994 –Nov. 1996	Superintendent dredging works on various projects in Germany, China and Argentina

COURSES

- Bonds, LC's and Incoterms, MYTY, April 2012
- Business Case Calculation & Investment analysis, IFDB, 20 September 2014
- FIDIC Contracting, Aradis Academy, 19 October 2015
- EMVI training, Brave Decisions, 23 January 2017
- Presentation Techniques, Expert Academy, 22 November 2018

LECTURES

- "Dredging Technology", KU Leuven, Belgium, 2020-present
- "Dredging and Hydraulic Transport", KU Leuven Campus Ghent, Belgium, 2008-present
- "Dredging, Monitoring and Mitigation", Port Engineering Short Course, Stellenbosch University, South Africa, 19-23 October 2015

CURRICULUM VITAE

PROMOTION OF MASTER PAPERS

- M. Lauret, "leidingweerstand tijdens het hydraulisch transport van grof zand-watermengsels van hoge dichtheid in een pijpleiding van grote diameter", TU Delft, 2001-2002 (first prize VBKO).
- J. Scheppers, Th. Vandercruysse, Snijgedrag van sleepkoptanden van een sleephopperzuiger in zandgronden", University College St. Lieven, Ghent, Belgium, 2009-2010.
- N. Houthuys, Deep Sea Mining: Manganese Nodules", University College St. Lieven, Ghent, Belgium, 2011-2012.
- J. Van der Steichel, M. Vanneste, "Actieve sturing van een sleepkop", University College St. Lieven, Ghent, Belgium, 2011-2012.
- P.J. De Bouver, B. Flamand, "Het gedrag van Zand bij baggeren gebruik makend van jets", University College St. Lieven, Ghent, Belgium, 2011-2012.
- S. Van Elslander, I. Volkov, Experimenteel onderzoek naar het snijgedrag van een sleepkoptand", University College St. Lieven, Ghent, Belgium, 2012-2013.
- J.H.J. Peters, R. Beun, "Experimental Research on Subsea Rock Installation", TU Delft, 2013-2014.
- S. Dirven, L. Vancauwenbergh, "Fall Pipe Testing at Dredging Lab", TU Delft, 2015-2016.
- S. Herregods, K. Delaere, "Analyse van de impact van stortsteenbescherming op de bodem komende uit een valpijp", KU Leuven Campus Brugge, 2017-2018.
- Th. Vande Ryse, D. Clybouw, "Kwantificatie van stuifzandbeperkende maatregelen op het eiland Texel", KU Leuven Campus Brugge, 2018-2019.
- R. Tant, "Bepaling van de impactkrachten van stortsteenbescherming op offshore pijpleidingen tijdens plaatsing aan de hand van modelproeven", KU Leuven Campus Brugge, 2018-2019.
- Georgios C. Papaioannou, "The economic impact of Port Maritime Access Canals to total supply chain costs", C-Mat UAntwerpen, 2018-2019
- Minh Hung Bui, "The economic impact of an offshore hub on supply chain costs", C-Mat UAntwerpen, 2019-2020
- T. Lietaer, "Validatie van rekenmodel voor zandtransport aan de hand van verzamelde meetresultaten", KU Leuven Campus Brugge, 2019-2020.

PUBLICATIONS

- THV Vlaamse Baaien, "Vlaamse Baaien, Veilig, Natuurlijk, Aantrekkelijk Duurzaam, Ontwikkelend, Van een smalle, harde naar een brede, zachte kust", Ostend, May 2009.
- V. Stratigaki, P. Troch, B. Malherbe, J. Fordeyn, "Vlaamse baaien development plan: estimation of the wave climate for Flanders bays using the numerical model mildwave", Proceedings of the 4th International Conference on the Application of Physical Modelling to Port and Coastal Protection, Coastlab 12, September 17-20, 2012, p. 175-176.
- J. Fordeyn, B. Malherbe, "Coastal Defence of Lowlands using Sand: Morpho-dynamic Concepts", Proceedings of the 8th International Conference on Coastal and Port Engineering in Developing Countries, Chennai, India, February 20-24, 2012, p. 932-943.
- B. Malherbe, J. Fordeyn, D. Defloor, "Flanders Bays on Belgian North Sea Coast: Smart beach & Dune Nourishment to achieve an Integrated and Sustainable Reinstatement of Beach Barrier Systems", Proceedings of Wodcon XX, Brussels, Belgium, June 4-7, 2013.
- J. Popma, R. Barth, M. Oudega, F. Schaars, R. Calje, J.Fordeyn, "Minimaliseren van het risico op zoute kwel PHZD", *Land&Water*, 11 (November 2018), p.18-19.
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- L. Perk, L. Van Rijn, K. Koudstaal, J. Fordeyn, "A Rational Method for the Design of Sand Dike/Dune Systems at Sheltered Sites; Wadden Sea Coast of Texel, The Netherlands", *J. Mar. Sci. Eng.* 2019, 7, 324
- J. Fordeyn, K. Van der Biest, E. Lemey, A. Boerema, P. Meire, "An Ecosystem Services Assessment of the Prins Hendrik Zanddijk", *Terra et Aqua* 157 (4) Winter 2019, 31-46.
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- G. Strypsteen, L.C. van Rijn, M.D. Hoogland, P. Rauwoens, J. Fordeyn, M.P. Hijma, Q.J. Lodder, "Reducing aeolian sand transport and beach erosion by using armour layer of coarse materials", Coastal Engineering 166 (2021) 103871. 1-15.
- Th. Mascart, T. Sterckx, S. Delerue-Ricard, J. Fordeyn, M. Huygens, "Coastbusters, a Nature-Based Solutions Coastal Management Alternative", *Terra et Aqua* 163 (2) Summer 2021, 26-37.

CURRICULUM VITAE

MALHERBE BERNARD

NATIONALITY Belgian
BIRTH DATE 12 August 1954

BIRTH PLACE Hasselt, Belgium

EDUCATION

- M.Sc. Geology, Katholieke Universiteit Leuven, 1976
- M.Sc. Geological Engineering, Ecole Nationale Supérieure de Géologie Appliquée (Polytechnical Institute, Nancy France), 1980

KNOWLEDGE OF LANGUAGES

	Mother Tongue	Good	Moderate	Basic
French	x			
Dutch		x		
English		x		
Spanish			x	
German				x
Vietnamese				x

PROFESSIONAL EXPERIENCE

October 2021 - present	Senior Advisor for Project Development & Conceptual Design Department at Jan De Nul Group of Contractors Fields of expertise: dredging/reclamation engineering, disposal dredged materials, coastal engineering, port engineering, hydro-sedimentological processes, ...
2019 - present	Member of the Board for the Blue Cluster, innovation cooperation in the field of blue economy, energy transition and associated marine matters
Sept 2010- 2021	Nominated guest-lecturer at University of Ghent (Elgium) – Faculty of Engineering and Architecture . Course Dredging Technology and Applied Hydro-Sedimentology
Sept. 2009 – 2021	Nominated guest-professor at Katholieke Universiteit Leuven (Catholic University of Louvain, Belgium), on the course Dredging Technology at Faculty of Engineering Sciences. Nominated guest-lecturer at Technical High School St Lieven, Ghent, associated with the Catholic University of Louvain, course on maritime, fluvial and estuarine engineering.
2008 – October 2021	Director Project Development and Conceptual Design at Jan De Nul Group of Contractors Conceptual design and project development in the fields of breakwaters, reclamation, port developments, artificial island creation, coastal protection,

	deep-sea mining, navigational access-channel…
References:	
Port Engineering	- Port of Zeebrugge Extension (Belgium): rubble-mound breakwaters, capital dredging, maintenance dredging, morphological impact on adjacent seabed/coastlines - Port of Hai Phong (Vietnam): capital dredging, maintenance dredging, hydro-sedimentological processes - Port of Dunkerque (France): maintenance dredging expertise & optimization - Port of Cai Mep (Vietnam): capital dredging, maintenance dredging, hydro-morphological processes on seabed and coastal sediments - Canal Martin Garcia – Rio de la Plata (Argentina-Uruguay): capital dredging, maintenance dredging, hydro-sedimentological processes - Maritime access to Port of Antwerp (Belgium): assessment of sedimentological and morphological processes - Port of Nantes St Nazaire (France): maintenance dredging and hydro-sedimentological processes - Port of Jebel Ali (Dubai – UAE): maintenance dredging processes and port developments - Port of Payra (Bangladesh): supervision and expertise for capital and maintenance dredging engineering
Coastal Processes & Engineering	- Coastal protection engineering & beach-nourishment engineering at Knokke-Heist Resort (B): hydro-sedimentological process assessment, numerical simulations, design - Coastal protection engineering & design of morphological beach nourishment at Bredene – De Haan – Wenduine Resort (B): hydro-sedimentological process assessment, numerical simulations, design - Coastal protection and nature –inclusive design at Prins Hendrik Zanddijk, Texel (the Netherlands) - Coastal protection engineering at Ouidah – Avlékété (Benin): hydro-sedimentological process assessment, numerical simulations, design
Environmental Processes	- Dredging, treatment and disposal of contaminated sediments at Port of Ghent (Belgium) - Bio-remediation (in-situ) of hydrocarbon contaminated sediments at marina Zoeterwoude (Netherlands) - Treatment and disposal of hydrocarbon contaminated sediments at Le Croisic Port (France)
Maritime & Dredging Engineering	- Feasibility assessment of new nautical access to the Bassac River (Mekong Delta-Viêt Nam) - Nautical and hydro-sedimentological study for the design of the Chaktomuk Junction between Mekong River, Bassac River and Tonlé Sap River, Phnom Penh (Cambodia) - Dredging expertise for the maintenance of the Chao Phraya River Entrance, Bangkok (Thailand) - Nautical accessibility improvement to the Port of Montevideo (Uruguay) - Engineering design of D&B contract for New Island Development (Dubai – UAE) - Expertise on siltation and maintenance dredging of the access-channel to the Port of Cutuco- La Unión (El Salvador) - Engineering design of Eve Island Development (Seychelles) - Engineering design of new access-channel to Guayaquil and Posorja Port (Ecuador)
Offshore pipelines	Front-End Engineering design for the Zeepipe I 42” & 850 km long offshore

	gas pipeline (North Sea) Detailed Engineering for the channel-crossing, shore-approach and landfall of Zeepipe I gas pipeline in the Port of Zeebrugge (Belgium) Detailed engineering for the Interconnector Pipeline Bacton-Zeebrugge: access-channel crossing, shore-approach and landfall at Zeebrugge Bad (Belgium) Detailed engineering of the gas pipeline Cruz del Sur (Uruguay-Argentina)
Oct. 2004 – 2007	Engineering Manager for specific projects or dedicated dredging methods/tools at Jan De Nul Group: Palm Island Jebel Ali (UAE), Dubai Waterfront Development Islands, Area Manager Offshore, including Contract negotiation, Project Director and Operations Follow-Up on site (supervision of Project Manager): De Kastri Oil Terminal, Sakhalin II pipeline landfall, MOF Port development at Chayvo (Sakhalin Island), Qatar II Gas pipeline project (Qatar)

Previous experience with other companies

1997 – Oct. 2004	Business Development Manager and project expert/project team coach at Haecon nv
1998	Expert for JICA (Japan International Cooperation Agency) for hydro-sedimentological, dredging and river training works (Red River Delta, North Viêt Nam)
1999 – Oct. 2004	Freelance hydro-sedimentological & dredging expert for development projects in estuaries and marine or coastal waters. Registered EIA expert at Flemish Authority OVAM for disciplines, water & soils
1990 – 1997	Head of Department "Geology, Dredging and Environment" at Haecon nv
1992 – 1997	Director of N-VIROTec nv (Ghent, Belgium), Construction & Installation of turnkey industrial & domestic waste-water treatment plants
1983 – 1993	Project Manager of dredging, coastal engineering, survey and environmental projects at Haecon nv
1981 – 1984	Project Engineer for applied sedimentology, dredging and survey projects at Haecon nv, Harbour & Engineering Consultants (Ghent, Belgium)
1980 – 1981	Military Service at the NATO's EGUERMIN Research and Development Division: Mine Burial Prediction Model
1977 – 1979	Coastal process engineer, dredging engineer in the Contractor's Joint Venture Zeebouw-Zeezand (JV of Jan De Nul, Dredging International, Baggerwerken Decloedt, SBBM, CFE, Pieux Franki, Royal Boskalis Westminster): construction of Port of Zeebrugge (B) Extension & coastal protection works

PUBLICATIONS

- IZWO report (National Oceanological Institute) - Nov. 1977: "Study of the sea bottom sediments in the area of Zeebrugge"
- IZWO report - December 1978: "Study of the suspension sediments in the North Sea in the area of Zeebrugge"
- Report nr. 15 of the Hydrographical and Coastal Service: "Study of the sediments in the area of Zeebrugge Measurements performed in 1976"

- IAS - International Meeting on Holocene Marine Sedimentation in the North Sea Basin (Texel - September 1979): "Measurements of sediment transport on and off the Belgian coast by means of fluorescent and radioactive tracers"
- SEME - (Symposium of Engineering in the Marine Environment) Bruges - May 1982: "Physical properties of sand and mud sediments"
- 8th. International Harbour Congress - Antwerp - June 1983: "Sediment transport measurements on and off the Belgian coast by means of tracers"
- EGUERMIN - Ostend - May 1981
  DER report nr. 94 NATO Confidential "Mine burial predictions"
- Séminaire sur les "Digues en Mer"
  Laboratoire Public d'Essais et d'Etudes, Casablanca, November 23-25, 1983.
  1. "L'influence des ouvrages portuaires sur la sédimentologie et les dragages du sîte" (Influence of harbour works on the local sedimentology and dredging).
  2. "La programmation des travaux de dragage d'entretien des complexes portuaires" (Programming maintenance dredging works).
- MARSIM '84 - Third International Conference on Marine Simulation, Rotterdam, The Netherlands, June 19-22,1984 :
  "A comparison between simulator and in situ manoeuvres of container ships calling at the Port of Zeebrugge"
- Council of Europe - Intensive Course on Modelling and Management of Marine Systems (Liège - September 1984).
- PIANC-bulletin nr. 48 (1985): "Navigation in muddy areas. The Zeebrugge experience"
- National Colloquium Belgian Committee on Engineering Geology (BCEG), Sart Tilman, Liège, Oct. 1985: "Maritime Canal Ghent-Terneuzen - Research Programme for dredging, treatment and disposal of contaminated mud".
- MARINTEC, China 1985 - Conferences, Shanghai, Dec. 1985: "The determination of the nautical bottom in muddy areas". (B. Malherbe)
- Oceanology International 1986 - XIth World Dredging Congress, Brighton (UK), March 1986: "Nautical bottom research and survey for optimisation of maintenance dredging in mud areas". (P. De Wolf, B. Malherbe)
- Symposium Ports and Waterways - Buenos Aires, Argentina, Oct. 1986: "Optimisation of maintenance dredging operations in maritime and estuarine areas". (C. De Meyer, B. Malherbe)
- International Association of Dredging Companies (IADC), Terra et Aqua, NR35, Dec. 1987: "Optimisation of maintenance dredging operations in maritime and estuarine areas".
- KVIV 9th. International Harbour Congress, Antwerp June 20-25, 1987: "Maintenance dredging at the Port of Zeebrugge : Procedure to achieve an operational determination of the nautical bottom".
- KVIV 9th. International Harbour Congress, Antwerp, June 20-25, 1987: "Belgian efforts to solve problems related to the dredging, treatment and disposal of contaminated dredged material: case study of the maritime canal Ghent-Terneuzen".
- Central Dredging Association - Dredging Day Hamburg, Sept. 28, 1988: "Treatment and disposal of contaminated dredged material from the Ghent - Terneuzen Canal: challenges for now and the nearby future." (Y. Kreps-Heyndrikx, R. Roman, J. Strubbe, B. Malherbe)
- Guest Lecturer at the UNESCO - IFAQ (International Post Graduate Training Course on Fundamental and Applied Quaternary Geology) course "Recent Marine Sedimentation" (Free University of Brussels, Brussels, 1988 to 1995)
- KVIV. Modern non-destructive soil investigation. Antwerp, November 23, 1988: "Nuclear, acoustic and mechanical investigation techniques of sediments for aid to hydrography and dredging" (B. Malherbe).
- Netherlands Hydrographic Society - Workshop on dredging specifications, Amsterdam, April 21, 1989: "Sediment detection and measuring systems as valuable management tools for hydrography and dredging works" (B. Malherbe).
- World Dredging Congress. WODCON, Orlando (Fl.), May 1989: "Technical and environmental parameters influencing maintenance dredging efficiency" (D. Vandenbossche, F. Warnier, B. Malherbe, B. Lahousse).

- International Seminar on the Environmental Aspects of Dredging Activities. Nantes, Nov.-Dec. 1989 (IMO) : "A case study of dumping of dredged material in open areas : the S1-dumping ground in the Southern Bight of the North Sea" (B. Malherbe).
- Permanent Post Academic Formation "Dredging and the Environment". Civil Engineering Technical University at Delft (The Netherlands), Nov. 1989: "Disposal options and their environmental impacts : Aquatic disposal" (B. Malherbe).
- International Workshop on Cohesive Sediments. IFAQ - Free University of Brussels, November 1990: "Towards the definition of the nautical bottom: the concept of rheological behaviour transition, R.T." (B. Malherbe).
- Lecturer in the post academic course of the "Technical University" of Delft (The Netherlands) for the course "Dredging and the Environment".(Nov 1989)
- PIANC-Congress Osaka 1990 - Section II 2.3. : "Controlled Upland Disposal at the Geuzenhoek Experimental Facility in Ghent" (Y. Kreps, R. Roman, B. Malherbe).
- Leading Ports '90 - II International Ports and Waterways Conference & Exhibition - Buenos Aires, November 12-16, 1990: "Sediment Management - A new concept for cost-effective maintenance dredging of ports and access channels (B. Malherbe).
- La Houille Blanche no. 4 - Paris, 1992 : "Etudes et optimisation des travaux de dragage au moyen de la radioactivité" (C. Brossard, J.P. Hélard, B. Malherbe, P. Monadier, P. Brisset, R. Hoslin, A. Caillot).
- Forum for Applied Biotechnology FAB '92 - Brugge (Sept. 24-25, 1992): "Bioremediation of dredged material with ABR-CIS" (C. De Meyer, B. Malherbe, K. De Vos)
- 23rd International Conference on Coastal Engineering ICCE-Venice, Oct. 1992: "Assessment of Coastal Processes for the Design and the Construction of the Zeepipe Landfall in Zeebrugge" (A. Eide, B. Malherbe, M. Mercanti, B. Lahousse).
- Coastal Zone 93 - New Orleans 1993: "Design and execution of beach nourishments in Belgium" (M. Helewaut, B. Malherbe).
- Coastal Zone 93 - New Orleans 1993: "Aquatic disposal of dredged material in the Belgian North Sea" (B. De Putter, P. De Wolf, B. Malherbe).
- 2nd Asian and Australasian Ports & Harbours Conference – Ho Chi Minh City, April 1997 :
  1. "Hydraulic and Sedimentological Survey for the Dredging of the Entrance Channel to the Bassac River" (Capt. L. Geerinck, B. Malherbe, Tran Van Tu)
  2. "Hydraulic and Sedimentological Study, Mathematical Modelling and Engineering Design of the Access Channel to Hai Phong" (Tran Van Dung, Phuong Hop, B. Malherbe)
  3. "Hydraulic and Sedimentological Survey for the Dredging of the Access Channel to Hai Phong" (Bui Anh Thuan, Dao Xuan Quang, B Malherbe, M. Crickmore)
  4. Study of Siltation for Hai Phong Port" (N. Bart, M. Crickmore, M. Dearnaley, B. Malherbe)
- WODCON XV World Dredging Congress, Las Vegas, July 1998
  1. "The Nautical Bottom Revisited" (F. Warnier, B. Malherbe, K. De Vos).
  2. "Optimised Open Water Disposal of Dredged Material of Flemish Seaports" (D. De Brauwer, F. Warnier, B. Malherbe, S. Verbanck).
  3. "Engineering Design of the Access-Channel to Hai Phong" (J. Smallman, M. Crickmore, B. Malherbe).
- Ministry of Equipment CETMEF, France, 2000 – 2001 " Techniques Modernes pour le Dragage et l'Environnement", Nantes, Aix-en-Provence, Rouen
- Dredging Symposium at the Port of Dunkerque, Oct 2002 « New challenges for the dredging technology at the edge of the next millennium »
- Terra & Aqua (IADC public. Issue 110), March 2008 " New possibilities for ripper-dredging of rock by means of very large trailing suction hopper dredgers" (B. Malherbe & P. De Pooter)
- PIANC public. March 2008 " Dubai Waterfront Development- Dubai: The making of an iconic waterfront development in the Arabian Gulf" (D. Naessens, B. Malherbe, J. Kop, F. Morobé)
- Guest Professor Lectures and Courses at Catholic University of Leuven (KU Leuven, since 2008):
  - "Dredging Technology": dredging techniques, hydraulic processes of slurries and dredged materials, elements of dredging processes,...
  - "Hydro-Sedimentology in coastal and marine environments"

- " Survey techniques for dredging and maritime engineering"

- Guest Professor Lectures and Courses (since 2008) at Technical Engineering High School, KAHO (Ghent) and KHBO (Ostend, Belgium)
  - "Building Materials in Maritime Engineering"
  - "Hydrology"
  - "Hydrometeorology"
  - "Survey systems"
  - "Exercises for hydraulic processes of dredged materials in pipes"
- Invited Lecturer (2010) at the University of Gran Canaria, Spain, in the Faculty of Sciences and Engineering Sciences:
  - "Hydro-sedimentology"
  - " Dredging Processes"
- 8th International Conference on Coastal and Port Engineering in Developing Countries, COPEDEC 2012, IIT Madras, India – February 2012 "Coastal Defence of Lowlands with Sand: Morpho-Dynamic Concepts of Beach-Dune System Rehabilitation" (Authors: Jan Fordeyn & Bernard Malherbe)
- EMSAGG-CIRIA Conference, 2012 –European Marine Sand and Gravel Group) – Ostend, Belgium , June 2012 – " Sustainable marine sand extraction for coastal protection works" (Authors: Bernard Malherbe & Jan Fordeyn)
- COASTLAB 2012 – International Conference on the Application of Physical Modelling to Port and Coastal Protection – Ghent, September 2012 " Flanders Bays Development Project: Estimation of the Wave-Climate for Flanders Bays using the numerical model MILDwave" (Authors: Vasiliki Stratigaki, Peter Troch, Bernard Malherbe, Jan Fordeyn)
- WODCON XX 2013 – World Dredging Congress – Brussels, June 2013 " Smart Beach and Dune Nourishments to achieve Sustainable Coastal Protection " (Authors: Bernard Malherbe, Jan Fordeyn)
- TECHBOOST 2016 – University of Ghent, Belgium , 21/04/2016 " Innovations in Maritime and Coastal Engineering – Nature-Based Solutions & Geo-Engineering"

Curriculum Vitae

Emile Lemey

Personal Info

Emile Lemey

Belgian – 14/12/1988
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Interested in hiking, nature exploration and reading about macro-economy & philosophy

Work Experience

2021	**Co-founder and Managing Partner** at Mantis Consulting
2017 – 2021	**Senior Engineer Project Development and Conceptual Design** at Jan de Nul Group • Sustainability and Innovation Projects within the Blue Economy • Nature-based Solutions for Marine Infrastructure
2016:	**Senior Environmental Engineer** at Jan De Nul Group • Nature-based Solutions for Marine Infrastructure • Environmental Management for Dredging and Offshore projects
2015	**Tender Engineer Offshore Renewables** at Jan De Nul Group
2013-2015	**Environmental Engineer** at Jan De Nul Group

Education

2011 – 2013	**Joint European Master of Science in Marine Biodiversity and Conservation** • University of the Azores, Horta – Portugal (Jan. 2013 – Jun. 2013) • University of Oviedo, Oviedo – Spain (Sep. 2012 – Jan. 2013) • Ghent University, Ghent – Belgium (Sep. 2011 – Jun. 2012)
2006 – 2011	**Master of Science in Bio-Engineering** (Environmental Technology) • Ghent University, Ghent – Belgium • Universidad Politécnica de Valencia, Valencia – Spain (Sep. 2009 – Jan. 2010)
2000 - 2006	**Sciences & Math (8h)** - De Bron, Tielt

Languages

Dutch (mother tongue), **English** (excellent), **French** (proficient), **Spanish** (proficient)

Experiences and Skills

Environmental management and monitoring	Studious
Nature-based solutions and Ecosystem services	Communicative
Science Based Targets	Analytical mindset
Project Management	Teamplayer
Carbon Footprinting and Life Cycle Assessments	Proactive

Projects and references

2021-2022 **Vandemoortele Carbon Footprinting** – Carbon accounting on group level

Project Manager for the energy reporting and carbon accounting (Scope 1, 2 and 3) for Vandemoortele Group in the context of Science Based Targets Initiative.

2021 **Infrabel LCC study** – Internalizing externalities for public tenders

Research project on how to integrate Life Cycle Costing in public tenders, with a special focus on how to assess and integrate carbon emission costs and other externalities.

2020 – 2021 **D4PV@Sea** – Design for public value at sea

Research on the integration of social and spatial risk with technical and financial risks for large scale marine infrastructure projects through a co-creation process. Carbon footprinting of offshore infrastructure projects.

2017 – 2021 **Project UNITED** – Offshore flat oyster aquaculture and nature restoration

R&D Engineer on multiple use of space within the Belgian Offshore Wind farms. Research on synergies between offshore wind production, flat oyster aquaculture and nature restoration.

2017 – 2021 **Coastbusters 1 & 2** – Ecosystem-Based Flood Defence

R&D Engineer on Nature-based solutions in coastal zone management as a way to reduce climate change risks. Additionally the resulting ecosystem services, carbon footprint and life cycle assessment were analysed and quantified.

2017 **Prins Hendrik Zanddijk** – Nature-based solutions coastal defense

Environmental coordinator for the multifunctional land reclamation project where flood defense is combine with nature development, public services and recreational appeal through a soft coastal defense design in The Netherlands. Ecosystem services and life cycle assessment cost comparison of different alternatives.

2016 – 2020: **MFiLand** – Multifunctional island at sea

Ecosystem services and life cycle assessment of offshore infrastructure projects. Carbon footprint and carbon capture for pumped hydro storage.

CURRICULUM VITAE: DAVID WILLIAM JAPP

Date of Birth:	30 June 1956
Nationality:	South African
Residence:	
Street	551 Bontebok Street, Scarborough, Cape Town
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Business Address:	
Street	Capricorn Marine Environmental (Pty) Ltd Unit 15 Foregate Square, FW de Klerk Boulevard, Cape Town, South Africa
Postal	P.O. Box 50035, Waterfront, Cape Town 8002 Tel. +27 21 425 2161
Academic Record:	
1975 – 1980	Merchant Navy Academy General Botha, Cape Town
1980 – 1983	Chief Navigating Officer (Foreign)
1983 – 1985	University of Cape Town; BSc (Zoology, Marine Biology and Oceanography)
1986	Rhodes University; BSc Honours (Ichthyology and Fisheries Science; Cum Laude)
1987 – 1989	Rhodes University and Sea Fisheries Research Institute; MSc (Ichthyology and Fisheries Science; Cum Laude)
Thesis :	An assessment of the South African longline fishery with emphasis on stock integrity of kingklip *Genypterus capensis (*Pisces: Ophidiidae*)*
Languages:	English (First language); Afrikaans (Basic written and spoken)
Membership of Professional Bodies:	SA Council for Natural Scientific Professions (SACNASP) Reg. No. 400208/12

Key Experience:

- Masters Degree in Fisheries Science
- Management of Company and Corporate Structures (founded companies in 1996 – FOSS cc, CapFish cc, CapMarine (Pty) Ltd
- Project Management, Project devlopment and Appraisal
- Environmental Impact Assessments
- Marine Stewardship Council Assessor and Peer Review College
- International and Regional Consultant and Director of FOSS cc and CapFish cc

Relevant Professional Experience (selected):

- South Africa : Head of Offshore Research - ***Sea Fisheries Research Institute*** (SFRI / DAFF) undertook 8 years of direct research and training of sea staff on biomass surveys as Chief Scientist;
- Consultant has worked extensively in the region including South Africa, Mozambique, Angola, Uganda, Namibia, Kenya, Tanzania and West Indian Ocean Fisheries Sectors since 1990;
- Benguela System : Benguela Current Commission (BCC) Strategic Impact Assessment (SEA)

- World Bank fisheries consultant – development and implementation of fisheries and aquaculture components : 1) MACEMP (Tanzania); 2) KCDP (Kenya) 3) SWIOFP (West Indian Ocean) 4) SWIOFish 1 (Current – WIO countries focus is Tanzania 5) LVEMP 2 (Lake Victoria) 4. KEMFSED (2020 in process)
- Environmental Impact Assessments of the Aquaculture Development Zone in Mossel Bay (South Africa)
- Scoping assessment and EIA of the potential for and Aquaculture Development Zone in Saldanha Bay, South Africa.
- Lake Victoria – field trip and overview of the "Source of the Nile" tilapia cage culture including provision of juvenile grow out and adult cage culture (conducted through LVEMP2 and the World Bank with the Lake Victoria Fisheries Organization and NAFIRI)
- Marine Stewardship Council : Assessor (current OPAGAC, Tristan da Cunha Lobster, Sea of Okhotsk Pollock, PNA Tuna Purse seine free school, Namibia hake plus numerous pre-assessments in the region).
- Fish for Good : South African small scale fisheries pre-assessments for MSC (8 fisheries) (Control Union).
- Member MSC Peer Review College.
- Benguela Current Convention : Governance review of maritime sectors and Blue Economy (Fisheries, Offshore mining, oil and gas, environment and maritime transport) – in process 2019-20.

Current Activities (April 2020)

i.	KEMFSED	–	Kenya (new fisheries governance project under development) - implementation
ii.	Namibia Hake	-	Full MSC assessment in process and harmonisation with SA Hake
iii.	Pollock	-	MSC assessment of Russian Sea of Okhotsk Pollock (surveillance ongoing)
iv.	FAO	-	Fisheries Technic al Review and Fishery Insurance Technical report in process
v.	OPAGAC	-	Purse seine MSC tuna assessment ongoing
vi.	BCC	-	Regional governance review ongoing
vii.	Deepwater lobster	-	SPRFMO exploratory fishery client / Cook Island advisor
viii.	SA Squid Jig	-	Rights Allocation economic assessment
ix.	SA Hake Longline	-	Rights allocation economic assessment
x.	MSC Peer reviews	-	Ongoing

Regional and International Experience:

Date	Location	Organisation	Position	Description
1987 – 1996	South Africa	Sea Fisheries Research Institute and Marine and Coastal Management (Ref. Dr Augustyn)	Head of Offshore Research	Fisheries Research head – Management of Offshore resources including Demersal, Large Pelagic and Small Pelagic resources. Ref. Is Dr J. Augustyn (Dept Agriculture, Forestry and Fisheries, Cape Town. (johann@sadstiia.co.za)
1996 – 2020	South Africa	Capricorn Fisheries Monitoring and Fisheries & Oceanographic Support Services	Consultant and Director	Many consulting projects with the FAO, World Bank, Benguela Current LME. Also developed the Regional Observers Programme. Specialization : Fisheries Management and Research ref. Xavier Vincent : xvincent@worldbank.org
2008 – 2009	Namibia	Benguela Current Commission	Consultant	State of Stock review – Benguela Current Commission. Hashali Hamukuaya (hashali@benguelacc.org)
2009 – 2017	Mombasa, Kenya	Development of the Kenya Coastal Development Project (KCDP) – World Bank and FAO	Fisheries Expert	Development and Implementation of the KCDP with World Bank Team – project participation was on near continuous basis until project effectiveness in June 2011. Portfolio : Fisheries Management, Research and Development : Ref is AG. Glauber – World Bank Office, Dar Es Salaam aglauber@worldbank.org
2007 – 2012	Tanzania & Zanzibar	Appraisal of the Tanzania *Marine and Coastal Environment Project* (MACEMP) – World Ban k / FAO	Fisheries Expert	Ongoing consultancy every six months to Tanzania – Project appraisal and Mid-Term review. Presently project is winding down and new MACEMP two phase being developed. Portfolio : Fisheries Management, Research and Development : Ref is AG. Glauber – World Bank Office, Dar Es Salaam aglauber@worldbank.org
2005 – 2020	Kenya, Tanzania, Mozambique and IOC countries	World Bank and FAO – Fisheries Expert Project development and implementation (South West Indian Ocean Fisheries Shared Growth and Governance Project (SWIOFish 1)	Fisheries Expert	Consultancy up to 2018 – fisheries components – development and implementation. Implementation ongoing 2020. Specialization : Fisheries Management and Development. Ref ; AJ Glauber aglauber@worldbank.org
2004 – 2007	IOTC	IOTC	Fisheries Experts	Provision of trained tuna tagging technicians and Cruise leaders for the IOTC Tuna Tagging programme (Note: this was done

Date	Location	Organisation	Position	Description
				through CapFish under contract to MEP). Ref : Gerard Dominique (IOTC) . gerard.domingue@iotc.org
2009 - 2020	IOTC	IOTC	Fisheries Observers	Provision of Observers for Transhipment vessels (ongoing). Gerard Domingue (IOTC)
2004 – 2014	FAO	FAO – Jessica Sanders / Ross Shotton	Fisheries Expert	Consultancy undertaken for technical works relating to 1. South West Indian Ocean Fisheries 2. Regional (Indian Ocean) fisheries reporting (catches) 3. Observer training (Madagascar) 4. Development of High Sea Guidelines (FAO)
2009 – 2017	FAO and WWF	FAO - and WWF USA	Fisheries Expert	Fishery Improvement Process – fishery pre-assessments for MSC and follow-up. Contract is current. Portfolio : Fisheries Management and Development. Domingos Gove (dgove@wwfesarpo.org)
2013	Angola Namibia (BCC)	ACP Fish 2	Fisheries Expert	Development of horse mackerel national plans and transboundary management (BCC)
2004 – 2020	International	MSC Assessments – RSA Hake, Tristan da Cunha lobster, Russian Pollock, PNA Tuna purse seine, OPAGAC Tuna and numerous pre-assessments and peer reviews	Fisheries expert : P2 and P3	Full assessments through CABs (Moody, Intertek, MRAG, Tavel, FCI, BV, Acoura, CU Pesca and Lloyds Register)
2019-2020	Benguela Current Commission	Maritime Governance Assessment and drafting of recommendations	Project Manager	Review of the current marine governance status in the BCC (Angola, Namibia, South Africa), drafting of consolidated report, Phase 2 in process implementing key actions.

Major Projects - Summary

- Fishery Resource Assessments
- Submission of management advice on hake (TAC assessments from 1989 to 1997);
- Biological assessment of hake species in South African waters and determination of ageing and stock structure;
- Design of hake-directed biomass surveys and cruise leader on up to four demersal surveys a year from 1989 to 1997;
- Demersal Working Group co-ordinator from 1991 to 1997 responsible for the management advice on hake and other demersal species;
- Project management (Scientist responsible) of hake-directed longline experiment in SA from 1992-1996
- Aquaculture Development Zone project definition
- Monitoring and provision of advice for Deep Water Lobster exploratory fishery in SPRFMO

Aquaculture-Specific

- Post graduate degrees in Fisheries science included bot fresh water and marine aquaculture
- East African project undertaken with the World Bank include major fisheries components which incorporate development of aquaculture (fresh and marine)
- Scoping studies and Impact assessments of Aquaculture Development Zones in Mossel Bay (South Africa)
- Scoping studies and EIA of ADZ in Saldanha Bay (this project is not yet activated and is pending subject to tender and financing)
- World Bank Project (LVEMP2) – consultant has been providing specialist fisheries advice to the LVFO including aquaculture field work in the Jinga / Lake Victoria including the use of Mukene as both feed and for human consumption
- Assessment of the Saldanha Bay Aquaculture Development Zone (ADZ – current)

Fishery Economics and Governance :

- Preparation of sector economic reports for RSA fisheries to assist with rights allocation procedures: Hake Longline, Inshore Trawl (Hake and Sole), Shark longline, South Coast Rock Lobster, Patagonian Toothfish, Deepwater Fishery, Midwater Trawl & Hake Handline
- Economic Assessment of the Wetfish and Freezer Trawl apportionment of Hake in Namibia
- BCLME – Ecosystem Approach to Fisheries – Cost Benefit Analysis (March 2006)
- Review of the West Indian Ocean Tuna Fishery and Potential Opportunities and Options for the Development of the Port of Victoria (Seychelles) – Completed March 2008

- Assessment of economic loss due to hydrocarbon development – numerous ongoing projects, PetroSA, Forrest Oil west coast gas, CNR well drilling and many others.
- Value-Adding of Anchovy *Engraulis encrasicolus* in South Africa and potential for poverty relief.
- Governance of Kenya Fisheries – Consultancy and report prepared for IOC Smartfish programme (2011)
- BCC Blue Economy Governance assessment

Other Projects Completed :

- Comparative assessment (socio-economic) of trawl and Longline fisheries in Benguela Region (BCLME).
- Evaluation of deepwater groundfish fishery in South West Indian Ocean 2004/2005 – FAO.
- Review of Ecosystem Approach to Fisheries Management for South African Fisheries (BCLME – MCM project).
- Review of South Africa's Indian Ocean fisheries – management and policy.
- Development of the South West Indian Ocean Fisheries Programme Implementation Plan – World Bank / FAO – Completed March 2007 (preparation of Project Documents for World Bank and GEF).
- Ecosystem Approach to Fisheries – BCLME project LMR/EAF/03/01 – Contracted consultant including Risk Assessments and Benefit Cost estimators for EAF – 2006.
- Indian Ocean Tuna Tagging Programme – 2004-2007 collaborative programme with McAllister Elliot and Partners (UK) and Capricorn Fisheries Monitoring cc (RSA)
- Indian Ocean Tuna Commission – 2009 Collaborative programme between MRAG (UK) and Capricorn Fisheries Monitoring cc for the provision of Observers and monitors on Indian Ocean tuna transhipment vessels.
- International Commission for the Conservation of Atlantic Tunas – 2007 Collaborative programme between MRAG (UK) and Capricorn Fisheries Monitoring cc for the provision of Observers and monitors on Atlantic tuna transhipment vessels.
- Domestic contract awarded (Sept. 2007) for the monitoring of national and high seas tuna longline fisheries, all trawl and small pelagic sectors and deep water rock lobster trap fisheries
- FAO / World Bank – review of Tanzania MACEMP programme with WB surveillance team (2008, 2009, 2010, 2011, 2012)
- FAO / World Bank – initiation of the South West Indian Ocean Fisheries Project – development of Project Implementation Manual and Observer programme (Mombasa – 2007- 2009)
- FAO / World Bank – Project development – Kenya Coastal Development Project (KCDP) – Ongoing 2010-2015
- FAO – EAF-Nansen Programme – Mozambique Sofala Bank Shrimp fishery management plan – development of effort management recommendations.
- FAO World Bank – Lake Victoria LVEMP project. Project management and support to Lake Victoria Fisheries Organisation.
- FAO World Bank – South West Indian Ocean Fisheries Shared Growth and Governance Project (Tanzania effective from June 2015)
- ICCAT Tuna Transhipment Programme Observers – CapFish project executant (2009 to 2012) – ongoing
- IOTC Tuna Transhipment Programme Observers – CapFish project executant (2010-2012) – ongoing
- Tuna Longline – RSA Observer deployments – 100% coverage on Deep Water Fishing Nations (RSA) – Project executant (2007-2012) – on-going
- IOTC Tuna – review of economic reports undertaken by WWF (10 country reports and summaries) – May 2012

Marine Stewardship Council :

- Certified MSC Assessor V2.0
- Full Assessments :
    - South African Hake Trawl (incl. recertification)
    - Sea of Okhotsk Pollock (Russia) (inlc. Audits and recertification 2017/18)
    - Tristan da Cunha Lobster (incl. rescertification 2017)
    - PNA purse seine skipjack and yellowfin unassociated (ongoing with objection)
    - Namibian hake
    - OPAGAC Tuna Purse Seine Governance principle (current)
    - Western Bering Sea Pollock
    - Sea of Okhotsk Crab Trap

    - Ecuador tuna purse seine
- Pre-assessments
    - Kenya Lobster,
    - Tanzanian Octopus,
    - Mozambique Shrimp (deep and shallow),
    - SA Pole and line tuna,
    - RSA Hake longline,
    - Namibia hake,
    - Uruguay Hake,
    - Mozambique linefish
    - Gulf Menhaden
    - Sri Lanka Longline tuna and swordfish
    - Fish for Good (MSC) South African small scale (6 species)
    - SWIOCeph – SWIO Octopus regional and national

- Fishery Improvement projects : Kenya Lobster, Mozambique shallow and deepwater shrimp, RSA Hake Longline
- Comparative assessment of the Mozambique linefish fishery (MSC preassessment) and SASSI assessment methodology.
- MSC Harmonisation workshops (P1 and P3)
- MSC Developing World programme
- MSC Peer review college member

Lecturing and Document Preparation:

- Extensive lecturing and seminar presentations (30 years) as well as detailed project and document preparation experience.
- Presentation of 5 x International courses in Namibia on International Agreements, UNCLOS, RFO's etc to Inspectors, Observers and Fisheries Managers.

Courses:

- Conflict resolution course completed in 1996
- Introductory course in resource economics completed in 2006 (Rhodes University MBA)
- Marine Stewardship Council Assessor certification
- Lead Auditor Management Systems : ISO 19011:2018

List of Recent Specialist Fisheries Assessments (selected only):

Shell Namibia Upstream B.V.: Environmental Impact Assessment for a 3D seismic survey within Namibian blocks 2913A & 2914B (PEL 39) (July 2014) Client: ERM South Africa (Pty) Ltd.

Shell South Africa Upstream B.V.: Proposed Exploration Drilling in the Orange Basin Deep Water Licence Area off the West Coast of South Africa (July 2014) Client: CCA Environmental (Pty) Ltd

Sungu Sungu Oil (Pty) Ltd: Environmental Impact Assessment for a proposed 3D seismic survey in the Pletmos Basin, southern Cape (February 2017) Client SRK Consulting (Pty) Ltd.

Spectrum ASA: Proposed 3D seismic survey, Walvis Basin, northern Namibia (January 2017) Client SLR Environmental Consulting (Pty) Ltd.

Spectrum ASA: Proposed 2D seismic survey, Orange Basin, southern Namibia (October 2016). Client SLR Environmental Consulting (Pty) Ltd.

LK Mining (Pty) Ltd: Proposed Prospecting Licence within EPL 5965, Hottentots Bay, Namibia – Baseline Study and Environmental Impact Assessment on Fisheries (April 2016) Client: SLR Environmental Consulting (Pty) Ltd

PetroSA (Pty) Ltd: Proposed Development of the E-BK Area in Offshore Licence Block 9, South Coast, South Africa. Client SRK Consulting (Pty) Ltd

Spectrum ASA: Western Approaches 2D Speculative Seismic Survey, South Africa. Client SLR Environmental Consulting (Pty) Ltd

Schlumberger: Proposed 3D Seismic Survey off the East Coast of South Africa (November 2015). Client: Environmental Resources Monitoring (ERM).

Rhino Oil & Gas Exploration South Africa (Pty) Ltd: Proposed Exploration Activities in Offshore Licence Blocks 3617 and 3717 off the South-West Coast of South Africa (November 2015) Client: CCA Environmental (Pty) Ltd

Xaris Energy Namibia (Pty) Ltd: Proposed Construction and Operation of a LNG Facility in Walvis Bay, Namibia (July 2015) Client: Enviro Dynamics Namibia (Pty) Ltd

Murphy Ludertiz Oil Co. Ltd: Proposed Exploration Well Drilling in Licence Blocks 2613A and 2613B off the coast of Namibia (July 2015) Client: SLR Environmental Consulting Nambia (Pty) Ltd

Total E&P SA Ltd : Offshore Agulhas Bank EIA fisheries impact assessments and ongoing engagement with MMO and PAM seismic operations.

Review and Strengthening of the Spatial Management of South Africa's Offshore Fisheries

Governance Baseline Assessment and Strategy for Strengthening Ocean Governance in the BCLME Region Prepared for the Benguela Current Commission (revisions in process January 2020).

Publications:

COCHRANE, K.C., D.W. JAPP, S.J. WILKINSON and S.J. NORMAN. 2019. Governance Baseline Assessment and Strategy for Strengthening Ocean Governance in the BCLME Region. Benguela Current Commission (unpub).

COCHRANE, K, D.W. JAPP *et al.* 2007 : Results and conclusions of the project "*Ecosystem approach to fisheries management in the Benguela Current Large Marine Ecosystem"* . FAO Fisheries Circular No. 1026.

COCHRANE, K, C.J. AUGUSTYN, T. FAIRWEATHER, D.W. JAPP, K. KILONGO, J IITEMBU, N. MOROFF, J.P. ROUX, L.SHANNON, B. VAN ZYL and F. VAZ VELHO. 2009. Benguela Current Large Marine Ecosystem – Governance and management for an Ecosystem Approach to Fisheries in the region. *Coastal management, 37:235-254.*

COCHRANE, K, and D.W. JAPP. 2012. Retrospective analysis on pelagic fishes in the South West Indian Ocean for the South West Indian Ocean Fisheries Project. Component 4 (23 November 2012)

COCHRANE, K and D.W. JAPP, 2015. Offshore fisheries of the Southwest Indian Ocean. (5). Pelagic Fisheries. *Oceanographic Research Institute* Special Publication No. 10 (eds. Van der Elst and Everett.

DURHOLTZ, M.D., L.J. ATKINSON, C.G. ATTWOOD, T.P. FAIRWEATHER, D.W. JAPP, R.W. LESLIE, K.J. SINK, M. SMITTH and S.J. WILKINSON. 2017. An overview of the demersal trawl fisheries in South Africa (in publ.)

HENRIQUES, R, E.S. NIELSENA, D. DURHOLTZ, D. JAPP, S. von der HEYDEN. 2017. Genetic population sub-structuring of kingklip (Genypterus capensis –Ophidiidae), a commercially exploited demersal fish off South Africa. Fisheries Research 187 (2017) 86–95.

JAPP, D.W. 1988 - The status of the South African experimental longline fishery for kingklip *Genypterus capensis* in Divisions 1.6, 2.1 and 2.2. *Colln. Scient. Pap. int. Comm. SE Atl. Fish.* **15(2).** 35-39

JAPP, D.W. 1989 - An assessment of the South African longline fishery with emphasis on stock integrity of kingklip *Genypterus capensis* (Pisces: Ophidiidae). **M.Sc. Thesis**, Rhodes University: [iii] + 138pp

JAPP, D.W. and A.E. PUNT 1989 - A preliminary assessment of the status of kingklip *Genypterus capensis* stocks in **ICSEAF** Division 1.6 and Subarea 2. *ICSEAF Document SAC/89/S.P.:* 15 pp (mimeo).

JAPP, D.W. 1990 - ICSEAF otolith interpretation guide No.3 - kingklip (publication completed but not published due to dissolving of ICSEAF).

JAPP, D.W. 1990 - A new study on the age and growth of kingklip *Genypterus capensis* off the south and west coasts of South Africa, with comments on its use for stock identification. *S. Afr. J. mar. Sci.* **9:** 223-237.

JAPP, D.W. 1993 - Longlining in South Africa. In: *Fish fishers and fisheries* L.E. Beckley and R.P. van der Elst (Eds). *Proceedings of the second South African linefish symposium, Durban, 23-24 October 1992.* Special Publication No 2: 134-139.

JAPP, D.W. 1995 - The hake-directed pilot study conducted from 23 May 1994 to 31 May 1995. *Mimeo* 110 pp

JAPP, D.W. 1997 - Discarding practices and bycatches for fisheries in the Southeast Atlantic Region (Area 47). *In* I.J. Clucas & D.G. James, eds. 1997. *Papers presented at the Technical Consultation on Reduction of Wastage in Fisheries.* Tokyo. FAO Fisheries Report No. 547 (Suppl.). Rome, FAO.

JAPP, D.W. 1999 - Management of elasmobranch fisheries in South Africa. In: *Case studies of the management of elasmobranch fisheries* Edited by R. Shotton. *FAO Fisheries Technical Paper 378/1* : 199-217.

JAPP, D.W. 1999 - Allocation of fishing rights in the South African hake fishery. In: *Case studies of Rights allocations*. *FAO Fisheries Technical Paper 411*.

JAPP, D.W. 2006 - Country Review : South Africa (Indian Ocean). *Review of the state of world marine capture fisheries management : Indian Ocean*. *FAO Fisheries Technical Paper 488*.

JAPP, D.W. 2008. Scientific rationale and alternatives for the introduction of Fishery Management Areas for hake. Unpub report. *South African Deep Sea Trawling Industry Association.*

JAPP, D.W. P. SIMS and M.J. SMALE 1994 - A Review of the fish resources of the Agulhas Bank. *S. Afr. J. Sci.* **70:** 123-134.

JAPP, D.W. 2010. Discussion Paper Prepared for Workshop on the Implementation of the FAO Guidelines for the Management of Deep-sea Fisheries in the High Seas. Pusan, South Korea (May 2009).

JAPP, D.W. 2010. Pre Assessment Report for the South African Longline Fishery for Hake Client: WWF (RSA) and Ocean Fresh. Capricorn Fisheries Monitoring cc. 3 February 2010 (final)

JAPP, D.W. 2012. Rapid Fishery Pre-Assessment for Marine Stewardship Council (MSC) Namibian Hake : *Merluccius paradoxus* and *M. capensis* undertaken for MRAG Americas

JAPP, D.W. 2012 . South African large pelagic (tuna) assessment. MRAG Americas: WWF ABNJ Tuna Project Baseline Analysis

JAPP, D.W. 2014. Development of a Training and Capacity Building Programme for Developing Country Fisheries Pursuing MSC certification: Principle 2 - Ecosystems Working towards Marine Stewardship Council Certification in a Developing Country – Identifying the gaps, needs and means to achieving certification

JAPP, D.W and A. JAMES 2005 - Potential exploitable deepwater resources and exploratory fishing off the South African coast and the development of the deepwater fishery on the south Madagascar Ridge. *FAO Fisheries Proceedings 3/2.* Deep Sea 2003 : Conference on the Governance and Management of Deep-sea Fisheries. R. Shotton ed.

JAPP, D.W., M. PURVES and S. WILKINSON. 2007. Benguela Current Large Marine Ecosystem State of Stocks Review 2007. Report No. 1 (2007) BCLME.

JAPP, D.W., M. PURVES and D. NEL. 2008. Draft management plan for the Prince Edward Islands Marine Protected Area : in Nel, D & Omardien, A. (eds): *Towards the development of a Marine Protected Area at the Prince Edward Islands.* WWF South Africa Report Series – 2008/Marine/001.

JAPP, D.W. and H. CURRIE-POTGIETER. 2009. FAO case studies : Marine Protected Areas. *The development and status of Marine Protected Areas in South Africa and Namibia.* (In press, FAO)

JAPP, D.W. AND M. SMITH 2012. Fisheries, Mammals and Seabirds specialist study Environmental Impact Assessment. Namibian Marine Phosphate (Pty) Ltd.: Dredging of marine phosphates from ML 170 Report (Revised 8 March 2012)

JAPP, D.W., KELLEHER, K, D. BOYER. 2013. Preparation of the Horse Mackerel (*Trachurus trecae*) Management Plan for Angola. ACP - Support for the devising of the management plan for the Horse Mackerel fishery Angola and Namibia Project ref. N° SA-1.2-B5 REL Region: Southern Africa Country: Namibia, Angola 27 October 2013

JAPP, D.W. AND A. HERVAS. 2013. Pre-Assessment Report – Uruguayan Hake fishery. Food Certification International Ltd Client : FRIPUR & Ocean fresh

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OSBORNE, R.F. , MELO, Y.C. , HOFMEYER, M.D. AND D.W. JAPP – Serial spawning and batch fecundity of *Merluccius capensis* and *M. paradoxus*. *S. Afr. J. mar. Sci.* **21:** 211 - 216.

PUNT, A.E. and D.W. JAPP 1994 - Stock assessment of the kingklip *Genypterus capensis* off South Africa. *S. Afr. J. mar. Sci.* **14:** 133-149.

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SMITH, M, COCHRANE, K AND D.W. JAPP. 2012. Review of Significant Bycatch species in the South African Hake-Directed Trawl Fishery. Prepared for the South African Deep Sea Trawling Industry Association in fulfilment of the Marine Stewardship Council (MSC) certification of the South African Hake-Directed Trawl Fishery: Condition 3

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Dr ROBIN CARTER

Specialist Consultant in Applied Marine Sciences

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BIOGRAPHICAL SKETCH

I carried out post graduate studies in marine science at the University of Natal (Dbn) (MSc) and University of Cape Town (PhD). Subsequent to that I was employed by CSIR, Stellenbosch, leading the Marine Biology Division and Marine Biotechnology Programme as well as coordinating their overall marine science research programme. During this period (1983 – 1997) I led and participated in contract work on oil and gas developments on continental shelves, harbour development studies, primarily in Saldanha Bay and mariculture development focussing on abalone. After leaving CSIR in 1997 I practised as an independent specialist consultant in applied marine science. Main areas of work were in harbour development (Saldanha, Cape Town and Ngqura), specialist studies within marine oil and gas development EIAs, and investigations on marine discharges and technical reviews of marine monitoring practice and applications. In 2005 I joined Lwandle Technologies (Pty) Ltd, a registered Level 2 BBBEE company focused on providing specialist scientific advice and measurement capabilities to commercial and state entities involved in marine and coastal development and enterprises. Clients included oil and gas companies, Maersk Oil, Sonangol, Petrobras, ENI, PetroSA, Anadarko/Total, Forest Oil and BP, with Shell and Sasol being indirectly served through other consulting groups. A significant component of my activities was assessing and measuring the environmental effects of harbour development and expansions of services. Contracts I led included studies for Transnet in the Ports of Saldanha Bay, Cape Town, Ngqura, Durban and Richards Bay, Namibian Marine Phosphates in Walvis Bay, Riversdale Mining Mozambique on coal export though the Zambezi River mouth, Vale (Brazil) on the development of coal export facilities in Nacala, Mozambique and for Anadarko Petroleum Corporation on the establishment of an LNG plant in Mozambique. Marine domestic and industrial discharges have been an important element of my activities with work on effluent tracking, site specific evaluations of effluent behaviour and ecological consequences, and participation in provincial and national policy development.

In March 2021 Lwandle Technologies was acquired by CLS (France) and merged with other groups to form CLS Southern Africa. With this I terminated my directorship in Lwandle and returned to offering services as an independent consultant.

EDUCATION

PhD Marine Ecology	University of Cape Town	1983
MSc Biological Oceanography (Cum Laude)	Natal University (Durban)	1978

PROFESSIONAL REGISTRATION

I am registered as Professional Natural Scientist in marine science with the South African Council for Natural Scientific Professions (registration # 400245/060) and am a professional member of the South African Institute of Ecologists and Environmental Scientists.

EMPLOYMENT

Current	Independent Specialist Consultant in Applied Marine Sciences
2005-2021	Lwandle Technologies: Director and Specialist in Applied Marine Sciences.
1998 -2005	Independent Specialist Consultant in Applied Marine Sciences.
1996-1997	Specialist Scientist in marine ecology, mariculture and ocean sciences, and Marine and Coastal Research Coordinator, ENVIRONMENTEK, CSIR, Stellenbosch.
1989-1996	Programme Manager, Marine Biotechnology, EMATEK, CSIR, Stellenbosch.
1983-1988	Head - Marine Biology and Ecology, and Specialist Researcher, Marine Plankton and Mariculture, Division of Earth, Marine and Atmospheric Science and Technology (EMATEK), CSIR, Stellenbosch.

RECENT EXPERIENCE RECORD – CONTRACTS (2010 onwards)

2022 NMP EIA & EMPR Amendments: Revisions based on supplemental studies and scientific advances *for* Namibian Marine Phosphates.

2022 Ecological risk assessment for an RO plant discharge, Matola River estuary, Mozambique *for* PRDW Consulting Port and Coastal Engineers.

2022 Oversight and direction of a three-year programme of marine environmental monitoring surveys around marine outfalls *for* City of Cape Town.

2021 Tubli Bay, Bahrain Water quality assessment *in* Tubli Bay and Ma'meer Canal Studies, Hydrodynamic and Water Quality Modelling – Cases 1 & 2; PRDW Consulting Port and Coastal Engineers.

2021 Lead Scientist for marine environmental surveys supporting an LNG production facility in Cabo Delgado Province, Mozambique *for* Total, Mozambique

2021 Assessment of the marine ecology risks of modifications to the chlorination procedures and residual chlorine in thermal discharges from the Koeberg Nuclear Power Plant as part of a Coastal Waters Discharge Permit application *for* PRDW on behalf ESKOM, South Africa.

2021 Development of the environmental component for the five-year revision of the South African 2030/2050 national port development plan *for* Advisian on behalf of Transnet National Port Authority.

2021 Receiving environment risk assessments for marine discharges in the proposed pipeline servitude at the Port of Ngqura, Algoa Bay *for* PRDW on behalf of the Coega Development Corporation.

2020 Specialist assessments for LNG infrastructure development in Palma Bay, northern Mozambique *for* Hatch comprising:

- Motivation for the use of the secondary dredge spoil dump site in dredging operations
- Identification of the environmental risks associated with dredge spoil disposal at the secondary dredge spoil reception site
- Recommendations on water quality monitoring for dredging operations
- Summary of ecological sensitivities at the proposed LNG berth location
- Summary of ecological sensitivities at the marine offloading facility location

2020 Development of environmental impact assessments for the installation of fibre optic communication cables in northern Mozambique, Comoros and Tanzania, *for* OSI/CSA on behalf of Speedcast, USA.

2019 Assessment of the marine toxicity risks of ODACON in the nearshore environment of the Koeberg Nuclear Power Station *for* Eskom.

2019 Northern Mozambique fibre optic cable permitting assessment *for* OSI/CSA on behalf of Speedcast, USA

2019 Strategic Environmental Assessment for aquaculture development in South African coastal waters: East London to False Bay, *for* CSIR on behalf of South African Department of Agriculture, Forestry and Fisheries.

2019 Development of addendum to the Anadarko EMPR for the Golfinho gas import pipeline servitude, northern Mozambique *for* SLR on behalf of Anadarko Petroleum Corporation.

2019 Tri-annual water quality and sediment properties survey of the Chevron marine outfall *for* CSIR on behalf of Chevron, South Africa.

2019 Specialist review of Maputo Port development EMPR *for* Impacto, Mozambique

2018 Fish factory discharge biogeochemical risk assessment and survey for the Oranjevis fish processing plant in St Helena Bay *for* Waylands Consultants.

2018 Specialist review of the receiving environmental component of fish factory discharges at the Gansbaai fish processing plant and development of a water quality monitoring plan as part of their coastal water discharge permit application *for* Waylands Consultants.

2018 Specialist review of the receiving environmental component of fish factory discharges at the West Point fish processing plant, St Helena Bay as part of their coastal water discharge permit application *for* PBHS.

2018 Saldanha Bay Oil Tanking Risk Assessment: Update of 2012 report with Lloyds' risks analysis *for* Sustainability Consultancy, Africa.

2018 Environmental assessment reviews for Small ports rehabilitation operations *for* PRDW on behalf of Western Cape Government.

2018 ExxonMobil licence block exploration: Metocean baseline and gap analysis *for* ExxonMobil.

2017 Monitoring of tritium and hydrazine concentrations in the seawater intake basin of a proposed Western Cape desalination plant *for* iX Engineers on behalf of the City of Cape Town.

2017 Cape Grace Hotel desalination plant permitting and environmental assessment *for* PRDW on behalf of Cape Grace Hotel.

2017 Elysium desalination plant Kwa-Zulu Natal metocean measurement campaign *for* Aecom on behalf of Umgeni Water.

2017 Specialist review of CSIR City of Cape Town marine outfalls assessment and analyses report with monitoring plan compilation *for* City of Cape Town.

2017 Metocean measurement campaign for desalination plants in Table Bay *for* Advisian on behalf of City of Cape Town.

2017 Small harbour sediment quality assessment at Saldanha Bay, Pepper Bay, Hout Bay, Kalk Bay, Gordons Bay and Hermanus *for* PRDW on behalf of Coega Development Corporation.

2017 Allan Gray desalination plant discharge modelling – Environmental aspects *for* PRDW on behalf of Allan Gray.

2017 Marine water quality and ecology aspects of dispersion modelling for proposed finfish farming in Saldanha Bay *for* PRDW on behalf of DAFF.

2017 Marine ecology specialist study for the creation of safe swimming zones at second beach, Port St Johns *for* EOH on behalf of DEA.

2016 The identification, monitoring and management of pollution at 'hot spots' locations in the BCLME *for* The Benguela Current Commission.

2016 Water quality aspects of ship-based marine diamond mining sediment plume modelling conducted by PRDW *for* De Beers Group of Companies.

2016 Basic assessment and CWDP marine ecology specialist study *for* Aquinon Aquaculture Abalone Farm, Riversdale, Southern Cape.

2016 Development of an environmental monitoring plan for the proposed LNG facility on the

Afungi Peninsula in the Palma District of Cabo Delgado Province, Mozambique *for* Anadarko Petroleum Corporation.

2016 Environmental baseline studies for an EIA of the proposed development of a light condensate export facility offshore of Inhassoro in Mozambique *for* ERM on behalf of SASOL, Mozambique.

2016 Assessment of the marine ecology risks of thermal discharges from the Koeberg Nuclear Power Plant as part of a Coastal Waters Discharge Permit application *for* PRDW on behalf ESKOM, South Africa.

2015 Marine benthos distribution survey at Chevron's Milnerton marine outfall *for* CSIR on behalf of Chevron, South Africa.

2015 IFC PS6 Marine ecology critical habitat assessment for Palma Bay, northern Mozambique *for* Anadarko Petroleum Corporation.

2015 Implementation of a biomonitoring programme on the effects of dredging and dredge spoil behaviour for the Port of Cape Town *for* Transnet

2014 Verification survey for water column and sediment properties in an offshore marine phosphate mining lease area in Namibia *for* Namibian Marine Phosphates, Namibia

2014 Specialist ecological studies and environmental baseline developments in Palma Bay, Mozambique for the proposed development of natural gas import and LNG export facilities *for* Anadarko Petroleum Corporation including:

- Characterisation of seabed features and linked ecology in the proposed dredging areas and marine infrastructure development footprint;
- Characterisation of the proposed Golfinho gas import pipeline corridor across Palma Bay in terms of biotopes and important ecological processes;
- Establishment of mixed rock and sand ecological baselines for shorelines on Tecomaji and Rongui Islands;
- Establishment of fringing coral reef ecological baselines off the Cabo Delgado peninsula, Tecomaji and Rongui Islands; and
- Coral transplant pilot studies in Palma Bay.

2013 Analysis of ROV video records taken from Block 1, Area 1 for relevant biological features *for* ERM on behalf of Anadarko Petroleum Corporation & Eni.

2013 Block 1506 East Hub offshore Angola marine environmental baseline survey *for* ARC on behalf of Eni

2013 Block 1506 Mpungi offshore Angola marine environmental baseline survey *for* ARC on behalf of Eni

2013 Specialist studies on marine ecology for offshore gas field development and onshore gas export facilities in northern Mozambique *for* ERM on behalf of Anadarko Petroleum Corporation, Mozambique including:

- Palma Bay inter and subtidal seagrass meadow surveys;
- Inner Palma Bay coral patch reef baseline surveys;
- Investigation into Crown of Thorns Starfish (COTS) and *Drupella* snail abundance and distributions on inner Palma Bay patch reef and outer fringing coral reef formations;
- Investigation into pock mark features within Palma Bay; and
- Seabed ecology surveys in the Prosperidade gas import pipeline corridor.

2013 Marine ecology specialist study as part of an EIA for the establishment of a manganese bulk handling facility in the Port of NgQura, South Africa *for* CSIR on behalf of Coega Development Corporation

2012 Block 1506 West Hub offshore Angola marine environmental survey *for* ARC on behalf of Eni.

2012 Saldanha Bay oil spill risk assessment – Marine Ecology *for* CSIR on behalf of Strategic

Fuel Fund, South Africa.

2012 Assessment of risks to marine ecology of the establishment of an LPG import facility in Saldanha Bay, South Africa *for* ERM on behalf of Sunflower.

2012 Marine ecology screening study for the development of a manganese ore export facility in the Port of Saldanha Bay, South Africa *for* PRDW on behalf of Transnet

2012 Assessment of the implications for marine ecology associated with the installation and operation of a bulk liquids transhipment facility in the Port of NgQura in Algoa Bay, South Africa *for* CSIR on behalf of Coega Development Corporation

2012 Specialist study on marine ecology for deep water dredging as part of marine phosphate mining, offshore Namibia *for* Namibian Marine Phosphates

2011 Marine ecology component of an ESHIA for exploration natural gas wells on the inner continental shelf off Angola *for ARC/SRK* on behalf of Sonangas, Angola

2011 Marine environmental survey for ENI, offshore Angola *for* ARC/SRK on behalf of ENI E&P

2011 Specialist study on estuary ecology for proposed appraisal oil well drilling in the Estuaire du Cameroun *for* CSIR on behalf of Glencore Exploration Cameroon Ltd.

2010 Investigation into the environmental implications of the decommissioning of the PetroSA FA Platform offshore of South Africa and recommendations of suitable decommissioning options *for* PetroSA

2010 Marine and estuary ecology specialist study on the effects of coal transhipment by barge through the Zambezi River mouth *for* ERM on behalf of Riversdale Pty Ltd.

2010 Marine ecology specialist study on the establishment of a coal loading facility in Nacala Bay, Mozambique *for* Aurecon on behalf of Vale, Brazil.

2010 Investigation into the marine ecology implications of the refurbishment of the Mizingani Rd seawall at Stone Town, Zanzibar *for* Aurecon on behalf of the Aga Kahn Trust.

2010 Investigation into the risks for marine ecology associated with the establishment and operation of an offshore LNG transfer facility at Mossel Bay, South Africa *for* Aurecon on behalf of PetroSA

2010 Compilation of an EMPR for the PetroSA FA Platform and associated infrastructure *for* PetroSA

2010 Marine/estuary ecology aspects of a cumulative environmental risk assessment for the Island View storage facility in Durban Bay *for* ERM on behalf of Transnet

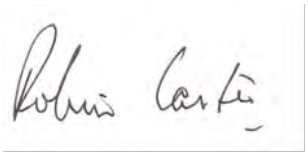
PUBLICATIONS

Author and co-author of 37 scientific publications on marine and coastal ecology and biology.

COMMITTEES AND ADVISORY BODIES

In the past I have served on the following committees/advisory bodies:

- South African Data Centre for Oceanography Steering Committee (SADCO)
- University of Port Elizabeth Institute for Coastal Research Advisory Committee
- SANCOR Mariculture Steering Committee
- Sea Fisheries Research Institute Scientific Working Group for Abalone.



01/09/2022

CURRICULUM VITAE

SMIT PIETER

NATIONALITY	Dutch
BIRTH DATE	10 May 1988
BIRTH PLACE	Delft, the Netherlands

EDUCATION

M.Sc. in Mechanical Engineering (Process Technology), Eindhoven University of Technology, 2012

KNOWLEDGE OF LANGUAGES

	Mother Tongue	Good	Moderate	Basic
Dutch	X			
English		X		
Portuguese			X	
German			X	
French				X

PROFESSIONAL EXPERIENCE

Since 4th of January 2016 working for Jan De Nul Group

Jan. 2020 - Present	Brazil - JDN office in Rio de Janeiro Production estimations, project and fleet follow-up, development of production models and providing training for super intendents Production Engineer
Nov. 2019 – Dec. 2019	Bangladesh – Payra Early Works, Opening Dredging of the Rabnabad Channel Towards Coal Power Plant at Payra Port. Production Engineer
Jun. 2018 – Oct. 2019	Ecuador - Canal de acceso - Obras de Dragado (2019-2043) 25 year concession agreement for the deepening and maintenance dredging of the 95 kilometer long access channel to the port of Guayaquil Production and Planning Engineer
May. 2018 – Dec. 2018	Germany – Nord Stream 2, Nearshore and Pomeranian Bay dredging, JV contract with DEME for dredging, backfill and reef reinstatement activities Production and Planning Engineer
Feb. 2018 – Nov. 2018	India – Deepening and Widening of Mumbai Harbour Channel and JN Port Channel - PHASE II (2017-2019), JV contract with Boskalis Production and Planning Engineer
Jan. 2016 – Jan. 2018	Belgium – JDN office in Aalst Production estimations, project and fleet follow-up, development of production models and providing training for super intendents Production Engineer

Previous experience with other companies

Feb. 2014 – Dec. 2015	Royal IHC The Netherlands – Blue Mining Conceptual design of a vertical riser pipeline system for the hydraulic transport of poly metallic nodules from water depths of up to 6,000 m. In addition, development of computer code for simulation of the slurry transport process. Project Leader
Nov. 2012 – Dec. 2015	Royal IHC The Netherlands – NewTriP Development and maintainance of a pump production software program for the dredging and mining industry. The software was programmed in MATLAB following the object oriented programming principles and is used on a daily basis by several dredging consultants for design of pump and pipeline systems. Project Leader

Mobile +27 (0) 724671626
Email: nina@steffanienviro.co.za

EXPERIENCE RECORD

Steffani Marine Environmental Consulting was established in 2002 by Dr Nina Steffani. The office is based in Cape Town, South Africa and includes laboratory facilities for the taxonomic identification of benthic macrofauna invertebrates. Dr Steffani is registered with the South African Council for Natural Scientific Professions (SACNASP) as *Professional Natural Scientist*.

SUMMARY PROFILE

Nina Steffani has extensive experience in marine biological research resulting in the completion of two postgraduate degrees and scientific publications in international and national high-class rated journals. Her main area of scientific research is in the field of rocky shore ecology and invasive biology. At the University of Cape Town, she was employed as scientific diver, research assistant, postdoctoral research fellow and research associate.

Since 2002, Steffani has worked as Marine Environmental Consultant and is primarily involved in the preparation of baseline studies, monitoring programs, specialist reports for Environmental Impact Assessments, and Environmental Management Plans, focussing both on rocky and soft-bottom substrates, as well as coral reefs and seagrass meadows. She is highly experienced in the taxonomic identification of benthic macrofauna species, and has many years of experience in leading and conducting field surveys. Furthermore, she is a registered scientific diver (Class III and IV).

The following table presents an abridged list of contract projects providing project title, client names, year of completion and a short summary of the project and the level of involvement.

DESCRIPTION OF PROJECTS

Year	Project and Client	Summary Description
2022	Offshore deep sea environmental baseline survey in southern Namibia for *Anchor Environmental Consultants*	Participation as benthic expert in an offshore environmental baseline survey in Total's deep sea licence area in southern Namibia. Work included annotation of video transects and collecting of deep-sea sediment and water samples.
2022	Benthic macrofauna analysis for *CLS Southern Africa*	Taxonomic analysis of benthic macrofauna from IMDH 2c Mining Licence Area, Namibia, and Camps Bay, South Africa.
2022	Benthic macrofauna analysis for the *CSIR*	Taxonomic analysis of benthic macrofauna from all South African ports as part the annual monitoring survey
2022	Monitoring of rocky shores in Elizabeth Bay, Namibia for *Pisces Environmental Services*	Participation in intertidal and subtidal rocky shore monitoring survey in the diamond mining licence area of Elizabeth Bay, Namibia.
2022	NMP Dredging of Marine Phosphates in ML 170 for *Dr. Robin Carter*	Updating of Potential Impacts on Marine Biota. Contribution on effects on benthos and benthos community recovery rates due to phosphate mining.
2022	Monitoring of sandy shores in MA1/Oranjemund, Namibia for *Pisces Environmental Services*	Participation in beach field survey in the diamond Sperrgebiet, Namibia.
2022	Benthic macrofauna analysis for the *CSIR*	Taxonomic analysis of benthic macrofauna samples from the vicinity of the Chevron oil marine outfall.
2021	Benthic macrofauna analysis for *CLS Southern Africa*	Taxonomic analysis of benthic macrofauna from Laaiplek St Helena Bay.
2021	Monitoring of sandy shores in MA1/Oranjemund, Namibia for *Pisces*	Participation in beach field survey in the diamond Sperrgebiet, Namibia.
2021	Subtidal rocky outcrops in the Saldanha Bay Aquaculture Development Zone for *Molapong Aquaculture*	Analysis of subtidal hard bottom communities on rocky outcrops in the Saldanha Bay Aquaculture Development Zone, South Africa.

Year	Project and Client	Summary Description
2020-2021	Coral relocation programme in Palma Bay, northern Mozambique for *Van Oord*	Coral biologist providing hands-on guidance and scientific advice on the coral relocation programme in relation to the dredging operations for the TOTAL LNG project in Palma Bay. The project included extensive fieldwork and focussed on whole coral colony relocation, establishing of coral nurseries, and deploying and populating of different types of artificial reefs.
2020	Baseline Survey of Coral Reef and Seagrass Habitats in Palma Bay, northern Mozambique for *Hatch South Africa*	Analysis of ROV footage, and compilation of several baseline survey reports on coral reefs and seagrass meadows in Palma Bay.
2020	Benthic macrofauna analysis for *Molapong Aquaculture*	Taxonomic analysis of macrofauna samples from Saldanha Bay from a proposed fishfarm.
2020	Macrofauna Baseline Study for Diamond Mining Licence northern South Africa for *Lwandle Marine Environmental Services*	Taxonomic identification of macrofauna from the mining block, statistical analysis of the data, and compilation of a comprehensive report on the survey.
2019	Rocky shore surveys along the Namibian coastline for *BCC (Benguela Current Commission)*	Participation as expert on rocky shores in several surveys along the Namibian coastline. Ongoing.
2019	Benthic macrofauna analysis from Saldanha Bay for *DAFF*	Taxonomic analysis and feeding mode analysis of macrofauna samples from Saldanha Bay from the proposed aquaculture zone.
2019	Marine monitoring survey for Hermanus Waste Water Treatment for *Aurecon*	Intertidal rocky shore survey and compilation of report for the marine outfall of the Hermanus Waste Water Treatment Works.
2019	Marine Ecology Specialist Study on the Chevron marine outfall for *Lwandle Marine Environmental Services*	Taxonomic identification of macrofauna from Table Bay and compilation of a report on the survey near the Chevron marine outfall at Milnerton.
2018	Benthic Fauna Survey in St Helena Bay for *Lwandle Marine Environmental Services*	Taxonomic identification of benthic fauna from St Helena Bay and statistical analyses.

Year	Project and Client	Summary Description
2018	Marine Baseline Study for a coal-fired power plant at Manda Bay, Lamu County, Kenya for *Natural Scientific Services*	Compilation of a Marine Baseline Study on mangroves, seagrass meadows, and coral reefs in Manda Bay, Lamu County, Kenya.
2017	Marine Specialist Study for the Swakopmund Road Upgrade for *Aurecon Namibia*	Marine Specialist Study on the potential impact from seawater abstraction for the Swakopmund – Henties Bay road upgrade. Includes field visits.
2016-2017	Benthic Fauna Baseline Survey in the UAE for *Lwandle Marine Environmental Services*	Taxonomic identification, statistical analyses and report compilation on benthic fauna from the United Arab Emirates (UAE).
2015-2016	Proposed development of a Floating, Storage and Offloading (FSO) unit by Sasol offshore central Mozambique for *Lwandle Marine Environmental Services*	Baseline study on intertidal seagrass meadow and coral reefs. Work included a diving/field survey and compilation of report.
2015	Review on Biological Sampling Methodologies for *Namdeb*	Review of biological sampling methodologies for unconsolidated sediments and hard seabed habitats.
2013-2015	Development of a Liquefied Natural Gas (LNG) Plant in Palma Bay, northern Mozambique for *Lwandle Marine Environmental Services*	Several Post-ESHIA monitoring studies on subtidal and intertidal seagrass beds, coral reefs and intertidal rocky shores. Work included diving/field survey and compilation of reports.
2014-2015	Development of a Liquefied Natural Gas (LNG) Plant in Palma Bay, northern Mozambique for *Lwandle Marine Environmental Services*	Pilot study on coral transplant feasibility in Palma Bay and compilation of reports.
2014	Reverse Osmosis Desalination Plant Municipality of Cape Town for *CSIR*	Marine Specialist Study on marine impacts from desalination plant structures and brine discharges.
2013-2014	Marine Phosphate Mining off central Namibia for *Namibian Marine Phosphate*	Verification survey as an addendum to the Marine Specialist Study compiled on the potential impacts associated with marine phosphate mining offshore the central Namibian coast. Macrofauna identification and reporting.
2013	Monitoring survey in Diamond Mining Licence Area offshore South Africa for *De Beers Marine*	Design of, and reporting on benthic monitoring surveys for the assessment of marine diamond mining impacts in deepwater mining licence areas off the west coast of South Africa.

Year	Project and Client	Summary Description
2013	Reverse Osmosis Desalination Plant at Volwaterbaai for *SRK*	Marine Specialist Study on marine impacts from desalination plant structures and brine discharges.
2012	Description of Benthic Macrofauna Communities in Phosphate Mining Licence Area off Lüderitz, Namibia for *LL Namibia Phosphate*	Species identification and reporting on the natural distribution patterns of macrofaunal assemblages in offshore phosphate mining licences in southern Namibia.
2012	Reverse Osmosis Desalination Plant Saldanha Bay for *CSIR*	Marine Specialist Study on marine impacts from desalination plant structures and brine discharges.
2011-2012	Development of LNG Plant in Palma Bay, northern Mozambique for *Lwandle Technologies*	Field survey of seagrass beds and coral reefs in northern Mozambique and reporting on the baseline environment.
2012	Marine Phosphate Mining off central Namibia for *Namibian Marine Phosphate*	Marine Specialist Study on the potential impacts associated with marine phosphate mining offshore the central Namibian coast.
2011	Proposed Development of an Industrial Park with marine discharge near Swakopmund/Walvis Bay, Namibia for Gecko	Contribution to a Marine Screening Report in conjunction with CSIR.
2011	Angolan Oil Exploration Block for *Lwandle Technologies*	Identification of macrofauna species from deep-water off Angola and analysis of results.
2011	Description of Benthic Macrofauna Communities in De Beers Mining Licence Areas for *De Beers Marine, De Beers Marine Namibia* and *Namdeb*	Specialist Report on the natural distribution patterns of macrofaunal assemblages in De Beers Marine offshore mining licences in South Africa and Namibia based on long-term data.
2010	Abalone Ranching Northern Cape Coast for *Diamond Coast Abalone*	Marine Specialist Report on the potential impacts associated with a proposed abalone ranching pilot project along the Northern Cape Coast.
2010	Phosphate Licence Blocks offshore Namibia for *Namibia Marine Phosphate*	Baseline survey design and reporting on deepwater macrofaunal communities off central Namibia including macrofauna species identification.
2010	RO Desalination Plant at Lamberts Bay for *Cederburg Municipality*	Marine Specialist Report on the potential impacts of a beach well intake structure and brine disposal of a proposed desalination plant near Lamberts Bay.

Year	Project and Client	Summary Description
Annual 2006-2012	Long-term intertidal rocky shore monitoring programme in Saldanha Bay, South Africa for *Anchor Environmental Consultants*	Leading scientist for rocky intertidal field surveys and reporting on their environmental status in Saldanha Bay, South Africa.
Annual 2006-2012	Long-term benthic macrofauna monitoring programme in Saldanha Bay, South Africa for *Anchor Environmental Consultants*	Benthic macrofauna species identification for the subtidal soft-bottom monitoring component.
Annual 2001-2012	Monitoring Surveys in Diamond Mining Licence Areas off Namibia for *De Beers Marine Namibia*	Design of, and reporting on deepwater benthic monitoring surveys for the assessment of offshore diamond mining impacts. Work included macrofaunal species identification, data analysis and reporting.
2009	Monitoring Survey in Diamond Mining Licence Areas off Namibia for *Namdeb*	Design of, and report on benthic monitoring surveys including macrofaunal species identification for the assessment of marine diamond mining impacts.
2004 2009 2010	Monitoring survey in Diamond Mining Licence Areas offshore South Africa for *De Beers Marine*	Design of, and reporting on benthic monitoring surveys for the assessment of marine diamond mining impacts in deepwater mining licence areas off the west coast of South Africa.
Annual 2004-2012	Rocky shore and sandy beach inter- and subtidal monitoring surveys in the Mining Licence Areas in southern Namibia for *Pisces/Namdeb*	Leading scientist for annual intertidal rocky shore field surveys and participant in diving surveys for the assessment of diamond mining impacts in the 'Sperrgebiet', southern Namibia.
2009	Phosphate Licence Blocks offshore Namibia for *ASS Investments Ninety Two*	Survey design and reporting on deepwater macrofaunal communities off central Namibia including macrofauna species identification.
2009	Chevron Marine Outfall at Milnerton for *Lwandle Technologies*	Benthic macrofauna species identification and data analysis for the impact assessment of Chevron's marine outfall.
2009	Desalination Plant North of Swakopmund, Namibia for *CSIR*	Co-author of the Marine Specialist Study for the impact assessment on brine disposal from a desalination plant and undertaking of a field diving survey.
2009	Baseline Survey for Jetty Extension in Lobito harbour, Angola for *Lwandle Technologies*	Benthic species identification and data analysis.
2008	Benthic Baseline Survey in Phosphate Mining Licence Areas offshore Namibia for *SAMICOR*	Benthic species identification and data analysis.

Year	Project and Client	Summary Description
2008	Environmental Management Programme Report for *De Beers Marine Namibia*	Leading author of an EIA and Management Plan for offshore Mining Licence Areas in Namibia.
2007	RO Desalination Plant at Wlotzkasbaken, Namibia for *Turgis Consulting (Pty) Ltd*	Co-author of Marine Specialist Study for an EIA on the construction and operation of a RO plant at Wlotzkasbaken, including beach survey.
2007	Reverse Osmosis Plant at Iron –ore Handling Facility, Port of Saldanha for *CSIR*	Co-author of Marine Specialist Study for an EIA assessing the impacts associated with the construction and operation of a RO plant at Saldanha Bay.
2007	EIA for offshore drilling operations, Angola for *Lwandle Technologies*	Co-author Marine Specialist Study for EIA on Angolan offshore drilling operations.
2006 2007	Biodiversity surveys in Angola for the BCLME programme for *Anchor Environmental Consultants*	Several rocky shore field surveys along the Angolan coastline to establish a biodiversity baseline. Species identification of intertidal beach macrofauna from the Angolan shoreline. Compilation of rocky shore baseline report.
2005	Pre-dredging Benthic Baseline Survey offshore Namibia for *SAMICOR/Midgley & Associates*	Benthic species identification and data analysis.
2005	Baseline survey, Saudi Arabia for *Anchor Environmental Consultants*	Benthic species identification for a baseline survey in Saudi Arabia.
2004	Kudu Power Plant Namibia for *CSIR*	Marine Specialist Study for the assessment of a cooling water discharge into the marine environment from a power plant.
2004	Marine Dredging Project in Namdeb's Marine Diamond Mining Concession Atlantic 1 MLA – Pre-Feasibility Phase for *Pisces/De Beers Marine Namibia/Namdeb*	Specialist study for the EIA for the Marine Dredging Project in Namdeb's Marine Diamond Mining Concession.
2003	Brand-Se-Baai mining licence area for *Pisces Environmental Services*	Report on intertidal and subtidal communities in the De Beers Namaqualand Mines Brand-Se Baai mining licence area.
2002 2003	Expansion of the Container Terminal Stacking Area at the Port of Cape Town for *CSIR*	Marine Specialist Study for container terminal extension and co-author of Strategic Environmental Assessment for the development of Cape Town harbour.

Full Name: Constanze Nina Steffani
Address: 21 Skippers End
Zeekoevlei 7941
South Africa
Mobile: +27-72 467 1626
E-mail: nina@steffanienviro.co.za

Date of Birth: 4 January 1967
Nationality: German, South African Permanent Resident
Languages: German, English

ACADEMIC QUALIFICATION

1996 – 2001 Department of Zoology, University of Cape Town, South Africa;
Degree obtained: **PhD Zoology**
Dissertation thesis: "Interactions between an indigenous limpet, *Scutellastra argenvillei*, and an alien invasive mussel, *Mytilus galloprovincialis*: moderation by wave action"

1987 – 1994 Studies in Biology, University of Hamburg, Germany;
Degree obtained: **Diplom (equivalent to MSc) Biology**
Diplom thesis: "Studies concerning seston in the salt-water biotop of the Beltringharder Koog" (in German)

PROFESSIONAL REGISTRATION

Registered with the South African Council for Natural Scientific Professions (SACNASP) as *Professional Natural Scientist* (Reg No 400122/07)

CERTIFICATION

Scientific Diver South African Class III and IV
DBOSIET Offshore Survival Certificate, OPITO approved (valid until Nov 2024)

PROFESSIONAL EXPERIENCE

Nov 2002 – present **Sole Proprietor of Steffani Marine Environmental Consulting.**
Compilation of Marine Specialist Reports for Environmental Impact Assessments (EIA), and Marine Baseline and Monitoring Studies for the assessment of human impacts on the marine environment, focussing both on rocky and soft-bottom substrates, as well as coral reefs and seagrass meadows. Proficient in conducting intertidal and subtidal field surveys, taxonomical identification of intertidal and subtidal benthic macrofauna, statistical data analysis, and scientific report writing. Work conducted for e.g. De Beers Marine, Debmarine Namibia, Namdeb, CSIR, Pisces Environmental Services, Lwandle Technologies,

	Anchor Environmental Consultants, EnviroAfrica, EcoSense, BCLME, DAFF, SAMICOR, Transhex, De Beers Namaqualand, Portnet, Transnet, IMT, Aurecon, Natural Scientific Services, SRK, and WSP. Proven track-record of successful project completion.
Nov 2002 – 2009	**Honorary Research Associate**, Department of Zoology, University of Cape Town. Research in rocky shore ecology, with special emphasis on the dynamic of the West Coast intertidal communities.
2001 - present	**Macrofauna Taxonomy Specialist**, benthic macrofauna identification projects for baseline, monitoring, and/or impact surveys for a large number of clients. Working areas include South Africa, Namibia, Angola, Mozambique, and South Arabia.
Jan 2001 - Nov 2002	**Postdoctoral Research Fellow**, Department of Zoology, University of Cape Town. Research in intertidal rocky shore ecology.
July – Dec 2001	**Research assistant** (in addition to Postdoctoral Research Fellowship), Department of Zoology, University of Cape Town.
Dec 1999 – May 2001	**Consultant Biologist**, work included e.g. report on climate change impacts on South African rocky shores, study on small-scale commercial limpet harvesting on the West Coast of South Africa, and economic evaluation of the South African abalone fishing industry.
1996 **–** 1997	**Research Assistant,** programme for a national experimental approach to management of intertidal resources; University of Cape Town.
1994 – 1996	**Consultant Biologist,** contract work in various projects including meiofauna identification and biochemistry; Institute for Hydrobiology and Fishery, University of Hamburg, Germany.
1991 – 1994	**Part-time Assistant Scientist,** biochemistry laboratory; Institute for Hydrobiology and Fishery, University of Hamburg, Germany.
1992/1994	**Assistant Scientist on Ship Cruises,** biochemical laboratory work on the German research vessel 'Meteor' in the North Atlantic and the Ukrainian research vessel 'Professor Vodyanitzky' in the Black Sea.

- Experienced and well-accredited southern African local and international expertise has been assembled for the various stages of the process.

APPENDIX

Curriculum vitae: Andrew I. L. Payne

Name of Firm: A & B Word Ltd (left South African Government Department, April 2000, and retired from Cefas, UK, September 2013, thereafter Associate)

Name: Andrew I.L. Payne

Profession: Director, International Fisheries Consultant and English grammatical editor

Year of Birth: 1946

Nationalities: British and South African

Years with Firm/Entity: 11 (with Cefas full-time for >13 years)

Membership of Professional Societies:

- Zoological Society of Southern Africa
- Royal Society of Biology (London)
- Marine Biological Association of the UK

Dr Payne is a graduate of the University of London and completed post-graduate degrees at the Universities of Stellenbosch (MSc; on age and growth of kingklip) and Port Elizabeth (PhD; on aspects of the demersal fishery on South Africa's south coast) in South Africa. He worked in Namibia for five years, South Africa for 25 years (eventually leaving as Director of the Sea Fisheries Research Institute), and retired in 2013 from the Centre for Environment, Fisheries and Aquaculture Science (Cefas), UK, where he was first Science Area Head for Fisheries and then "roving" international fisheries consultant in which role he *inter alia* managed a large commercial contract evaluating sites for future nuclear power stations to be built in the UK, and the Fisheries Science Partnership, an initiative bringing scientists and fishers together in a common aim to produce information of use to those charged with managing Europe's fish stocks. Most of his research work was conducted in South Africa, and he has published widely in the scientific literature, mainly about fisheries management and on demersal fish in particular, being involved over the years in all facets from basic biological research through to the stock assessment process and subsequent advice to management. He was scientifically and administratively active in the Benguela Ecology Programme, was involved in drafting South Africa's first democratic fisheries policy (which later became enshrined as the Marine Living Resources Act), and was a leading player in the establishment of the Benguela Current Large Marine Ecosystem project and the Benguela Environment, Fisheries, Interaction, and Training (BENEFIT) project, the latter two concentrating on three countries, Angola, Namibia and South Africa. From 2003 to 2011, he was Editor-in-Chief (and from 2000 to 2003 editor) of the ICES Journal of Marine Science, was the founding editor/editor-in-chief (and now international panel member) of the (South) African Journal of Marine Science, and is Series editor of the Springer book series Humanity and the Seas. He has also conducted peer expert review of fisheries in Argentina, South Africa and the USA, and was involved in the EU's TACIS project on Sustainable Management of Caspian Fisheries, among several other EU projects. He has led or been involved in certification reviews for the Marine Stewardship Council, notably for Antarctic krill, Cornish hake and Russian pollock, has acted as an expert peer reviewer of reports on, among others, the US Limited Entry Groundfish Trawl fishery and the SA deep-sea hake trawl fishery, and has led or participated in surveillance audits for different fisheries worldwide. He was also part of an international (independent) team that formally evaluated the ICCAT Bluefin tuna research programme. Finally, he has personally written/edited one book − "Oceans of Life off Southern Africa", and lead-edited and contributed to two more − "Management of Shared Fish Stocks", and "Advances in Fisheries Science; 50 years on from Beverton and Holt", the last two both for Cefas, and provides editorial services (including editorship and formal instruction courses in scientific writing) and peer review for a variety of clients and scientific journals.

Summarized highlights

- More than 50 years of fisheries science, management advice, strategy and policy development in southern Africa and/or the UK
- Many years of scientific leadership and mentorship in South Africa and the UK
- 25 years of advising on infrastructural needs relating to all aspects of fisheries and the marine environment
- More than 20 years (in small periods of a month at a time) of expert advisory reviewing and chairing of expert scientific meetings in the USA, and of leading a Cefas initiative in this aspect corporately
- Several years of participating in and leading a Regional Research and Training Project and a strategic "Large Marine Ecosystem" project in southern Africa (South Africa, Namibia and Angola)
- Expert external reviewer of the technicalities of bottom fisheries management in Argentina
- Experience as an Expert in Regional Fisheries Management for the EU's 2-year TACIS project "Sustainable Management of Caspian Fisheries", 2004-2006 (visiting and interacting with/advising scientists and managers in Azerbaijan, Kazakhstan, Iran and Russia)
- Evaluator of Fisheries Management Systems for fisheries requiring maintenance of Marine Stewardship Council accreditation
- Regular participant (sometimes lead) member of MSC certification and surveillance audit panels for various fisheries worldwide (noting that MSC certification requires environmental as well as fisheries and biological expertise)
- Book and journal editor and provider of editorial services and courses in scientific writing

Education:

Institution	Date(s)	Degree(s) or Diploma(s) obtained
University of Port Elizabeth, South Africa	1983−1986	PhD Zoology
University of Stellenbosch, South Africa	1973−1974	MSc Zoology
University of London, UK	1965−1968	BSc (Hons) Zoology

Employment Record:

Date from - Date to	Location	Company	Position	Description
2013 – date	UK	A&B Word Ltd, UK (and formal Associate of Cefas)	Director (and Associate)	Marine Research consultant and provider of editorial services. This includes independent evaluation of environmental assessments, Expert Advisory work for EU projects (EcoFishMan and MareFrame) and ICCAT (the Atlantic tuna commission), MSC certification, surveillance and peer review work, various other small consultancies in different research and advisory projects, including one relating to environmental impacts of offshore mining for phosphate off Namibia, plus editorship and editorial consultation and provision of formal scientific writing courses, internationally

2005 – 2013	UK	Cefas	International Fisheries Consultant	Direct work and manage contract staff, including delegation responsibility, to ensure delivery of all activities conducted within contracts, manage delivery of a large contract for the UK Government with the Fishing Industry, manage an even larger commercial contract with EDF Energy investigating issues and impacts relating to new nuclear build, involvement in several EU projects on the technical side, and bring in, and sometimes deliver, relevant international business advice. **Selected Projects**: • Caspian Sea, 2004–2006, Expert in Regional Fisheries Management for the EU's 2-year TACIS project "Sustainable Management of Caspian Fisheries" (visiting and interacting with/advising scientists and managers in Azerbaijan, Kazakhstan, Iran and Russia • UK, 2008-2013, project-manage a large contract with EDF Energy looking at water dynamics and quality, resource issues, etc, around potential new nuclear power station sites • UK, 2005-2013, Delivery manager for the Fisheries Science Partnership project (UK Government). Ensured quality of delivery of all projects from idea through to presentation of results. • USA, 2002-2010, In small periods of a month at a time, reviewed and/or chaired meetings in the USA (Centre for Independent Experts). After 2007, led the Cefas review team for that work on a corporate basis. • MSC-associated accreditation work.
2000 – 2005	UK	Cefas	Head of Fisheries Management Science Area	Direct work and manage staff, including delegation responsibility, to ensure delivery of all activities conducted within the Science Area, and bring in, and sometimes deliver, relevant international business

1986 − 2000	Cape Town, South Africa	Sea Fisheries Research Institute	Assistant Director, then Deputy Director, then Director	Lead research, develop strategy for marine research back-up to advice, ensure adequacy of infrastructure for delivery, and advise Government
				
				Selected Projects:
				• Southern Africa, 1970−2000
				  ○ 30 years of fisheries science, management advice, strategy and policy development in South Africa and Namibia (SA Government)
				  ○ 20+ years of scientific leadership and mentorship in South Africa (SA Government)
				  ○ 20+ years of advising on infrastructural needs relating to all aspects of fisheries and the ecosystems in which they are found (SA Government)
				  ○ Several years (1996−2000) of participating in and leading a Regional Research and Training Project and a strategic "Large Marine Ecosystem" project in southern Africa (SA Government, NORAD Norway, GTZ Germany)
				• Argentina 1997
				Expert external reviewer of the technicalities of hake fisheries management in Argentina

1974 – 1986	Cape Town, South Africa	Sea Fisheries Research Institute	Senior Scientist	Involved in research on the hake fishery and the ecosystem in which the species lives
1970 − 1974	Walvis Bay, Namibia	Sea Fisheries Research Institute	Demersal Research Scientist	Set up demersal research unit and carry out initial research underpinning the management regime

Full CV including complete publication record available on request