

DR ROBIN CARTER

Name of organization: Lwandle Technologies (Pty) Ltd
Profession: Marine Scientist
Position in Firm: Director, & Specialist in Applied Marine Science
Date of Birth: 07/05/1946
Years with Firm: 13 years

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 Level 2 BEE company focused on providing specialist scientific advice and measurement capabilities to commercial and state entities involved in marine and coastal development and enterprises. Our clients include oil and gas companies, Maersk Oil, Sonangol, Petrobras, ENI, PetroSA, Anadarko, Forest Oil and BP, with Shell and Sasol being indirectly served through other consulting groups. A significant component of our business is assessing and measuring the environmental effects of harbour development and expansions of services. Recent contract work covers studies for Transnet in the Ports of Cape Town and Durban, Namibian Marine Phosphates in Walvis Bay, Riversdale Mining Mozambique on coal export through 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 discharges form another important element of Lwandle's business portfolio with our work ranging from effluent tracking through site specific evaluations to participating in provincial and national policy development.

EDUCATION

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

2005 current	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 (2004 onwards)

- 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 of 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 transshipment 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 transshipment 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
- 2009 Marine benthos distribution survey at the Chevron marine outfall *for* CSIR on behalf of Chevron, South Africa

- 2009 EIA for exploration drilling in Block 2 *for* AEC/SRK on behalf of Sonagas, Angola
- 2009 Marine environmental monitoring of dredging activities for berth deepening in Ben Schoeman Dock, Port of Cape Town *for* Rohde Nielsen AS
- 2009 Marine water and sediment quality baseline investigation for the establishment and operation of an oil refinery at Lobito, Angola *for* ERM, South Africa.
- 2008 Environmental assessments and specialist studies on dredging operations in Saldanha Bay as part of new berth construction for increased iron ore exports under the phase 2B expansion *for* PDNA/SRK on behalf of Transnet
- 2008 Screening study for a marine terminal on the Namibian coast for the export of coal *for* SRK
- 2008 Site selection and environmental (marine ecology) screening study for the development of a coal fired power station at Walvis Bay *for* Ninham Shand
- 2008 EIAs for exploration drilling in Blocks 34 and 3/05 *for* AEC/SRK on behalf of Sonangol, Angola
- 2008 EIA for Canuku Oil Field decommissioning *for* AEC/SRK on behalf of Sonangol, Angola
- 2007 Reviews of environmental issues relating to oil field decommissioning *for* PetroSA, South Africa
- 2007 Specialist study on the ecological effects of increased ballast water discharges to Saldanha Bay due to increased iron ore exports under the phase 2B port expansion *for* PDNA/SRK
- 2007 Specialist study on the ecological effects of blasting in Saldanha Bay as part of new berth construction under the phase 2B port expansion *for* PDNA/SRK
- 2007 Environmental impact assessment on exploration drilling in Block 16, offshore Angola *for* Maersk Oil Angola
- 2007 Environmental impact assessment on marine seismic surveys in Block 3/5, offshore Angola *for* Sonangol, Angola
- 2007 Inventory risk assessments for five abalone and one oyster farm *for* Agriculture Risk Specialist, South Africa
- 2007 Environmental assessments and specialist studies on dredging operations in Saldanha Bay *for* Transnet
- 2007 Environmental assessments and specialist studies on dredging operations in the Port of Cape Town Bay *for* Transnet South Africa
- 2007 Environmental assessments and specialist studies on dredging operations in the Port of Ngqura *for* Transnet
- 2007 Seismic survey EIAs in blocks 8 and 23 offshore Angola *for* Maersk Oil, Angola
- 2006 Determination of fresh water aquifer flow effects on abalone farm intake seawater quality and probable risks to abalone inventory *for* Roman Bay Abalone Farm, Gansbaai, South Africa
- 2006 Assessment of the potential marine ecology impacts of a desalination plant in KwaZulu Natal *for* Umgeni Water.
- 2006 Specialist advisor to the South African Government delegation to the IMO Marine Pollution Protection Committee Meeting (MEPC 54) *for* Dept Environmental Affairs and Tourism.
- 2005-06 Investigation into the cumulative environmental effects of effluent discharges into KwaZulu-Natal inner continental shelf waters *for* Wildlife and Environmental Society of South Africa (WESSA).
- 2005 Biodiversity risk assessment for aquaculture of marine ornamental fish and soft corals *for* Eskom Aquaculture Research and Infrared Centre of Excellence, Durban.
- 2005 Measurements of marine discharge performance: achieved dilutions and compliance with RSA water quality guidelines *for* Heartland Leasing (Pty) Ltd, Umbogintwini, KwaZulu Natal.
- 2005 Peer review of Sappi Saiccor (Pty) Ltd Marine environmental monitoring – 2004 Survey Report *for* Sappi Saiccor (Pty) Ltd, Umkomaas, KwaZulu Natal
- 2005 Environmental monitoring for trial bulk mining by dredger in southern Namibia *for* Aquarius Hopper Dredge Project, Exficor, Cape Town.
- 2005 Specialist review of Aqaba Tourist Development water quality numerical modelling

- investigation *for* PRDW Consulting Engineers (Pty) Ltd, Cape Town
- 2005 Congo River estuary ecology environmental baseline study, Angola LNG Plant ESHIA *for* CSIR, Stellenbosch.
- 2005 Preliminary ecological assessment of potential environmental fatal flaws – Saldanha Bay CCGT-Cooling water purge dispersion study *for* CSIR, Stellenbosch.
- 2004 Peer review of Sappi Saiccor (Pty) Ltd Marine environmental monitoring – 2003 Survey Report *for* Sappi Saiccor (Pty) Ltd, Umkomaas, KwaZulu Natal.
- 2004 Peer review of effluent and effluent discharge monitoring programmes *for* Huntsman Tioxide, Umbogintwini, KwaZulu Natal.
- 2004 Peer review of effluent and effluent discharge monitoring programmes *for* Umbogintwini Operational Services, Umbogintwini, KwaZulu Natal.
- 2004 Evaluation of the environmental implications and sustainability of effluent management options in the Buffalo City Municipality *with* Sue Land & Associates and Prof Alec Brown (UCT) *for* Development Bank of Southern Africa.
- 2004 Specialist review of The Department of Water Affairs and Forestry Draft Operational Policy for the treatment and disposal of land-derived wastewater to the marine environment of South Africa *for* CSIR, Stellenbosch, South Africa.
- 2004 Assessment of the probable environmental effects of underwater blasting to widen the sea water intake channel for an abalone farm *for* Hermanus Abalone (Pty) Ltd, New Harbour Hermanus.

PUBLICATIONS

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

COMMITTEES AND ADVISORY BODIES

Dr Carter has 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.



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