

Science and Engineering Support to Future Ports

Steven Weerts

Coastal Systems & Earth Observation

Carl Wehlitz

Coastal Engineering & Port Infrastructure

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science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA





CSIR

Touching lives through innovation

Mandate

"The objects of the CSIR are, **through directed and particularly multi-disciplinary research and technological innovation**, to foster, in the national interest and **in fields which in its opinion should receive preference**, industrial and scientific development, either **by itself or in co-operation** with principals from the private or public sectors, and thereby to **contribute to the improvement of the quality of life of the people of the Republic**, and to perform any other functions that may be assigned to the CSIR by or under this Act."

Ports, in Partnerships

TRANSNET



*national ports
authority*

Local and international consultancies

- WSP, PRDW, ASP Tech

National authorities

- Dept Fisheries, Forestry, Environment

Regional authorities and funding agencies

- UNEP (Abidjan and Nairobi Conventions)

Non-profit and inter-governmental organisations

- Port Management Association of Eastern and Southern Africa (PMAESA)

Universities

- TU Delft, University of Stellenbosch, University of Cape Town, Nelson Mandela University, University of Zululand



Ports and the Environment

Steven Weerts

Coastal Systems & Earth Observation

Dredging assessment and authorisation (London convention)

- Develop and deploy observational and measurement platforms

Pollution and impact monitoring, long-term ecological research

Specialist Environmental Impact studies

- Predict consequences and trade-offs in ecosystems services under different

Development of mitigation strategies

- Decision-support to enhance design,

Development management tools

and sustainable benefit flows to the wider society, now and in the future



Dealing with the Green Handbrake

Ocean and Coastal Management 199 (2021) 105390



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Ocean and Coastal Management

journal homepage: <http://www.elsevier.com/locate/ocecoaman>

The natural environment in port development: A ‘green handbrake’ or an equal partner?

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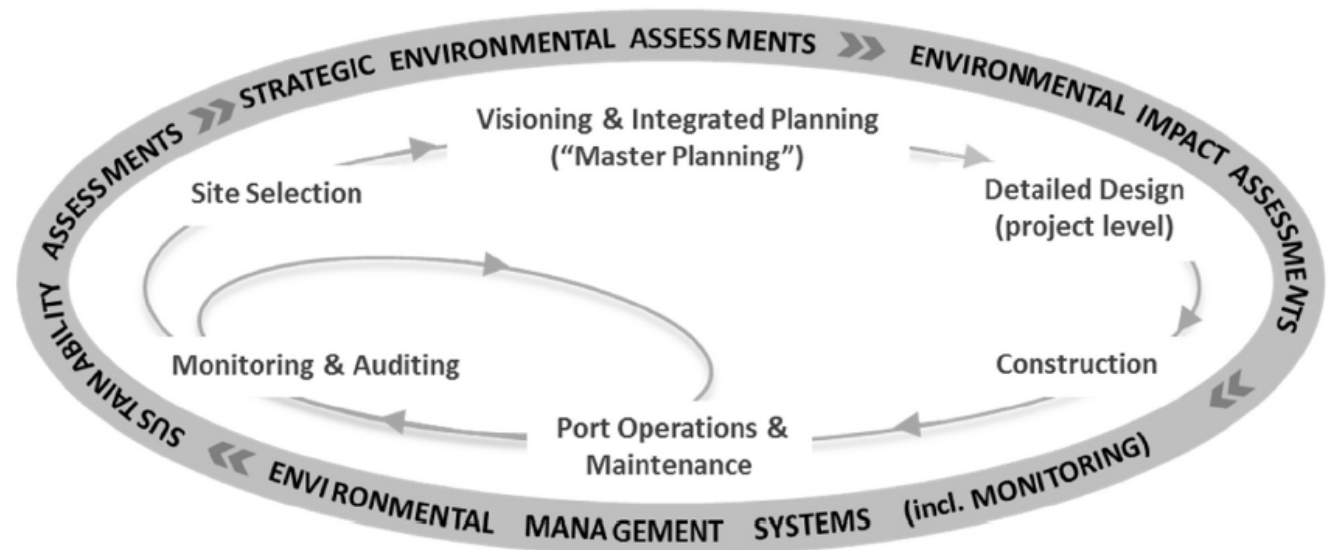
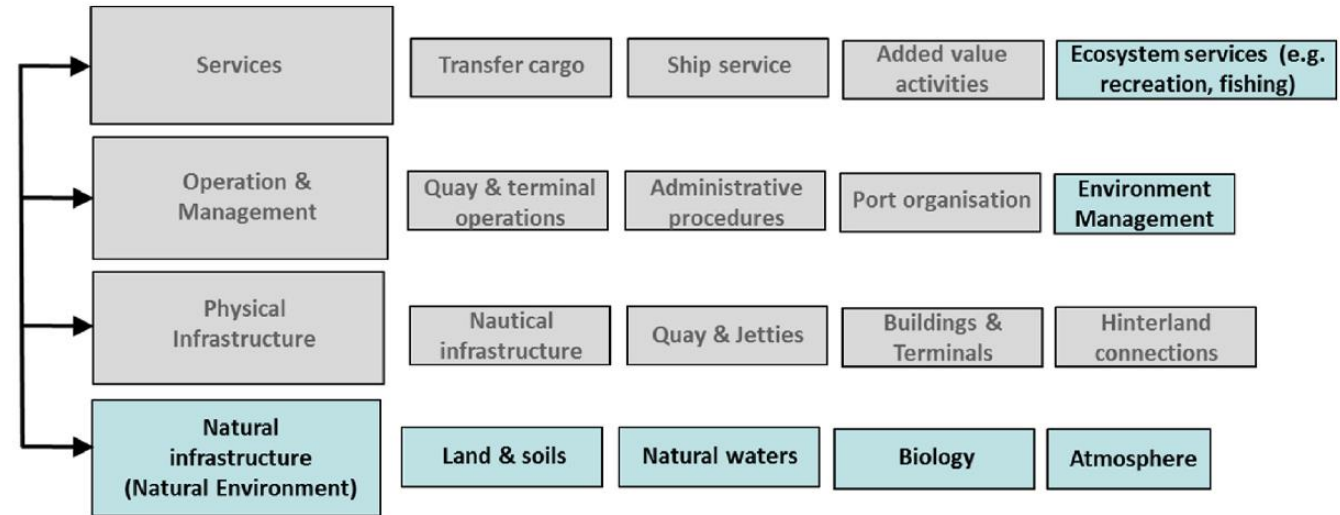
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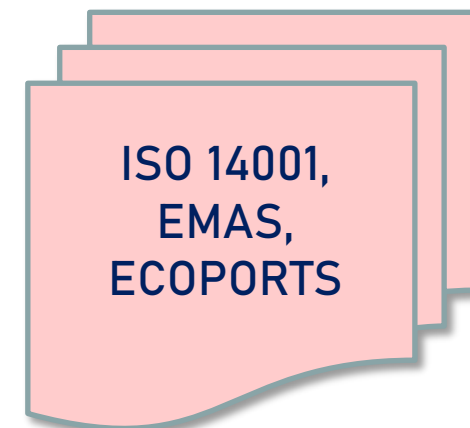


Environmental Management Systems for African ports

WMU Journal of Maritime Affairs

<https://doi.org/10.1007/s13437-022-00262-6>

ARTICLE



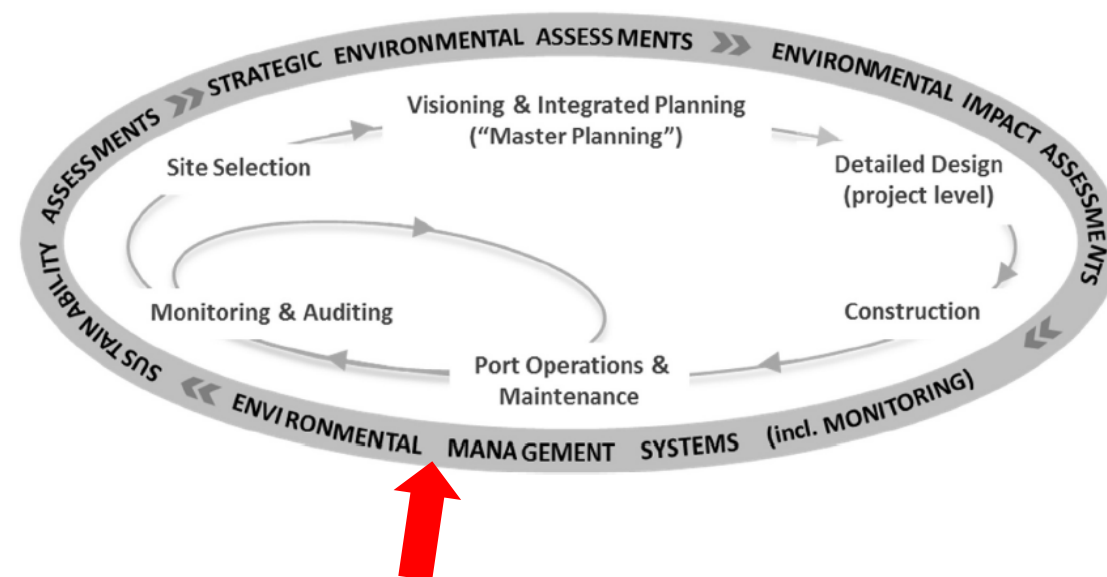
Adapting environmental management systems for African ports

Sumaiya Arabi^{1,2} · Susan Taljaard^{3,4}  · Steven Paul Weerts^{1,5}

Received: 2 July 2021 / Accepted: 23 January 2022

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Adapting the Plan-Do-Check-Act Cycle



Towards Sustainable Port Development in Western Indian Ocean

A Toolkit for Sustainable Port Development in a Blue Economy

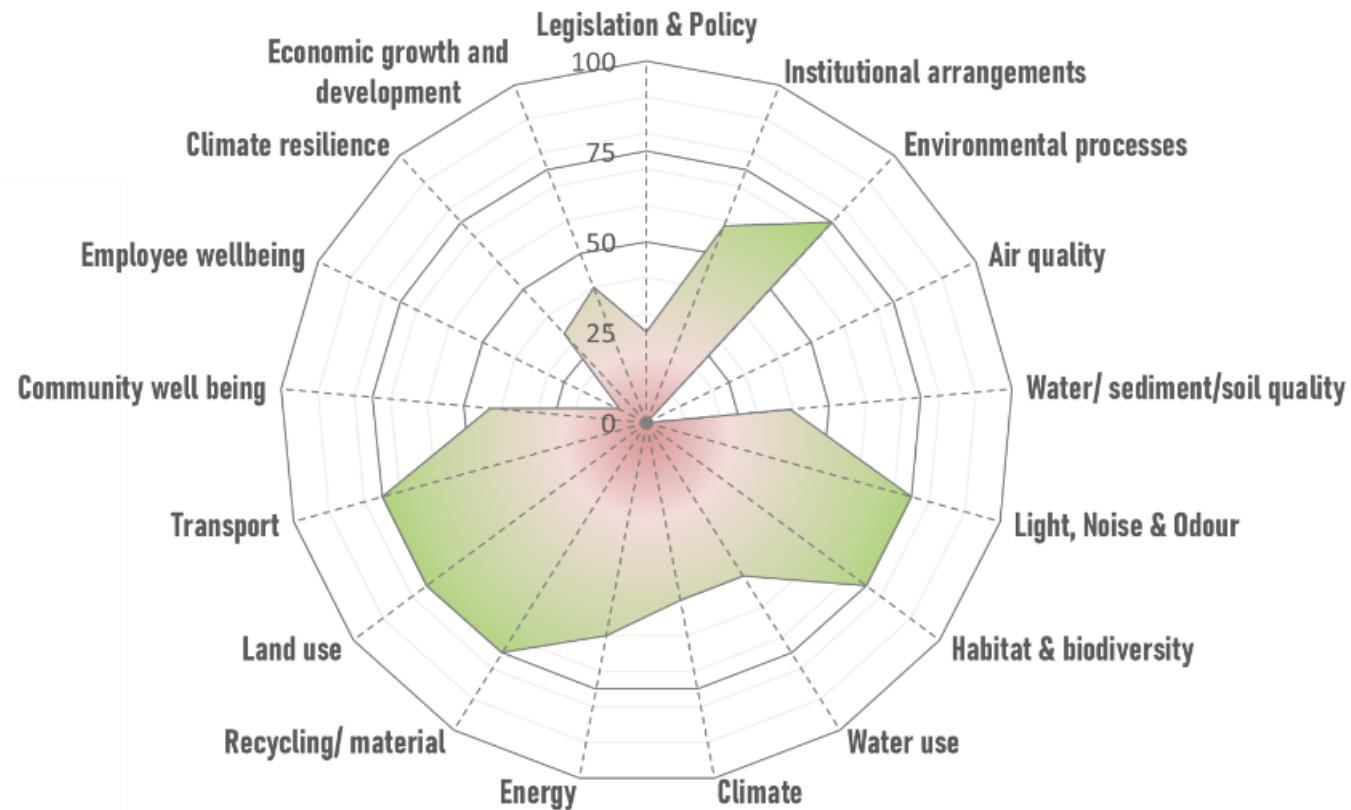


**PORT MANAGEMENT ASSOCIATION OF
EASTERN & SOUTHERN AFRICA**

Port Sustainability Performance Index

Susan Taljaard, Jill Slinger, Steven Weerts, Heleen Vreugdenhil and Cebile Nzuzza

Annual Sustainability Performance per Category





Engineering in Ports

Carl Wehlitz

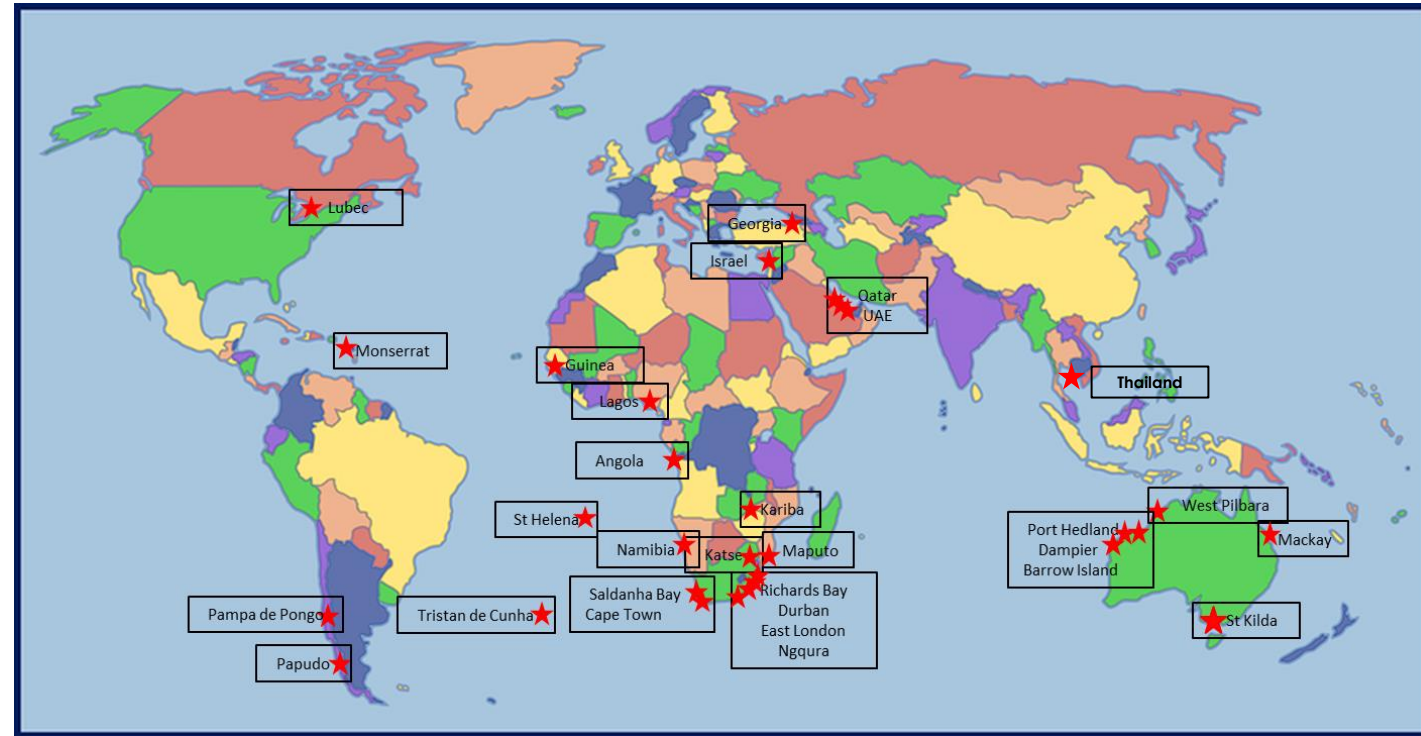
Coastal Engineering and Port Infrastructure

- The CEPI group is based in Stellenbosch and focusses on:
 - Port and coastal engineering
 - Ship motion and navigation studies
 - Instrument deployment and data management
 - Physical and numerical modelling
- CEPI manages the largest physical modelling laboratory in the southern hemisphere.
- The laboratory is 11 000m² and equipped with multiple flumes and basins for a full suite of 3D, Qusi-3D and 2D capabilities
- Department of Science and Innovation investment to upgrade the laboratory. On completion will have the largest 2D flume in the southern hemisphere.



CSIR Business and Impact

- Industry and research projects are undertaken for local as well as international clients.
- Served some of the largest ports in the world.
- Extensive testing and optimisation done for all South African National ports.



Impact

- CSIR's capabilities in numerical ship motions and ship navigation have allowed the development of a number of in-house software technologies.
- CSIR supports Transnet National Ports Authority (TNPA) with decision support systems and specialised applications that are essential for safety and efficient operation of the ports.
- CSIR collects metocean data for determining design conditions, incident investigation and climate change research. CSIR's Cape Point wave time series spans more than 50 years.



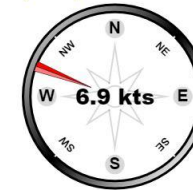
CAPE TOWN IPOSS
INTEGRATED PORT OPERATION SUPPORT SYSTEM
 Monday, 03 July 2023, 14:24:00



Waves

Wave Height (Hs) at	Monday, 03 July 2023, 13:33:00	2.1 m	
Wave Height (Hmax) at	Monday, 03 July 2023, 13:30:00	3.1 m	
Wave Period (Tp) at	Monday, 03 July 2023, 13:33:00	14.3 s	
Wave Direction (deg) at	Monday, 03 July 2023, 13:33:00	253 °	W
Sea Surface Temperature (°C) at	Monday, 03 July 2023, 13:30:00	15.3 °C	

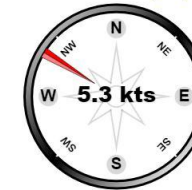
South Spur Compact Weather Station (Real Time)



Barometric Pressure	1,022 hPa
Relative Humidity	84 %
Air Temperature	16.3 °C

Monday, 03 July 2023, 14:24:42

Ben Schoeman Wind Station (every 1 min)



Monday, 03 July 2023, 13:17:00

Port Control Wind Station (Real Time)



Monday, 03 July 2023, 14:28:16

Future

Climate change and the impact on ports is potentially a major economic disruptor:

- CSIR is currently working with TNPA on a number of climate change initiatives.

Eco-engineering

- Currently testing eco-friendly armour on behalf of international clients
- CEPI and CS&EO research into eco-engineering to develop synergies in ecological and engineering criteria





Thank you for your attention.

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