IMDC

International Marine and Dredging Consultants (IMDC) is an engineering and consultancy company specialized in a vast range of water related projects. Our highly qualified staff offers advice based on recent research results of leading universities and research institutes and hands-on experience acquired throughout the years. One of IMDC's activities is Coast & Estuaries.

More information can be found on our website www.imdc.be

Coasts & Estuaries

The world's coastlines are increasingly impacted by climate change, with rising sea levels, stronger storms, and accelerated erosion threatening both natural systems and human assets. At IMDC, we combine scientific understanding with engineering expertise to deliver sustainable, data-driven solutions for coastal and estuarine management.

Through advanced numerical modelling, empirical analysis, and physical testing, our experts assess hydrodynamic and morphodynamic processes from erosion and sedimentation, wave transformation, overtopping, and flooding to design resilient and adaptive shorelines.

This expertise allows us to offer a complete range of services under five key domains:

1. **Climate Adaptation & Integrated Planning**
2. **Multi-Hazard Risk Assessment & Resilience Design**
3. **Coastal Engineering & Hybrid Protection Solutions**
4. **Estuarine Systems Engineering & Adaptive Management**
5. **Enhancing Resilience of Assets & Infrastructue**

Services

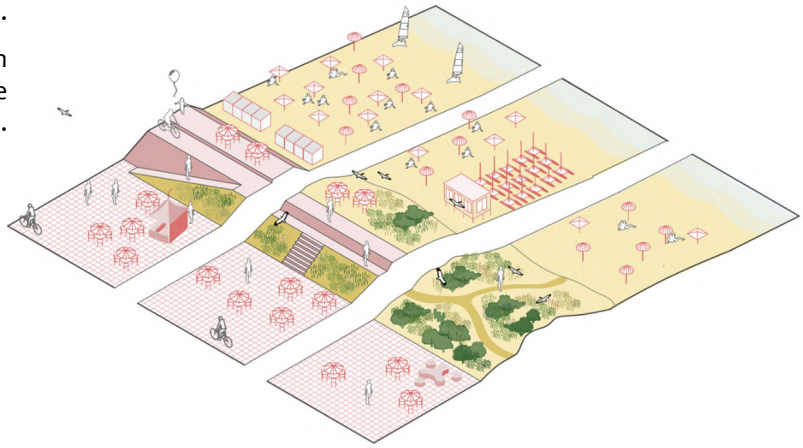
Climate-Smart Adaptation & Integrated Coastal Management

IMDC supports clients in developing proactive adaptation strategies that align with evolving climate, social, and regulatory conditions.

We combine engineering design with long-term spatial planning to prepare coastal systems for future sea-level rise, storm intensity, and ecological change.

Our services include:

- **Climate risk and vulnerability assessments**
- **Evaluation of ecosystem services and co-benefits**
- **Adaptation pathway development and coastal master planning**
- **Adaptive management frameworks linked to monitoring indicators**
- **Integration of Nature-Based Solutions (NbS) such as dunes, wetlands, and mangroves into engineering design**



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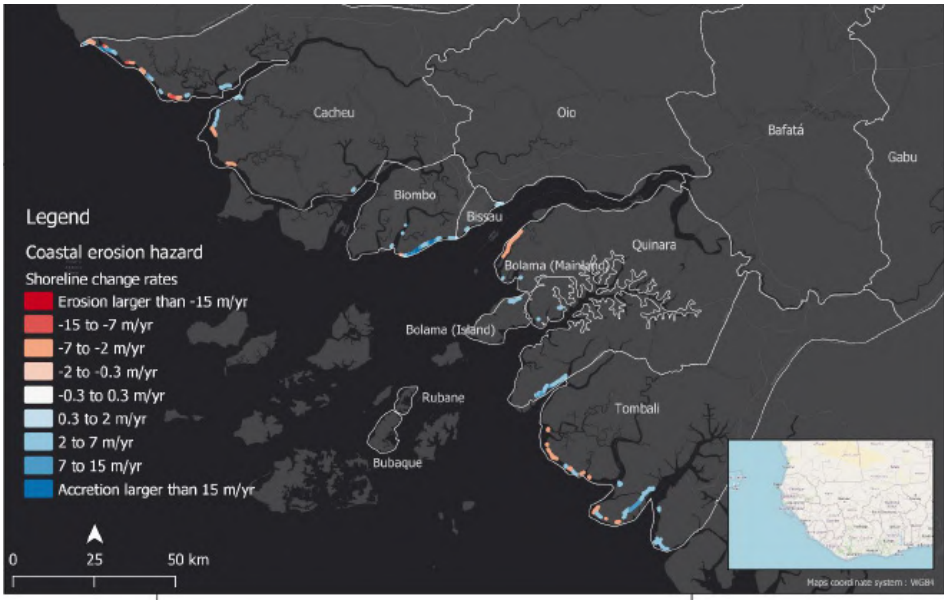
By blending scientific precision with practical design, we deliver adaptation strategies that are technically feasible, economically sound, and environmentally responsible.

Multi-Hazard Risk Assessment & Resilience Design

IMDC conducts comprehensive hazard and risk assessments to quantify exposure and vulnerability to flooding, coastal erosion, storm surges, and compound hydrometeorological events.

Using coupled hydrodynamic, wave, morphological, and rainfall-runoff models, we simulate multi-source flooding and shoreline evolution to identify system weaknesses and evaluate adaptation strategies.



Our services include:

- **Flood, storm surge, and coastal erosion modelling and mapping**
- **Early-warning systems and decision-support tools**
- **Risk zoning and cost–benefit analysis of mitigation measures**
- **Design of flood and erosion defences and evacuation plans**
- **Technical support for emergency preparedness and disaster response**

IMDC delivers actionable insights and resilient design solutions that help clients reduce physical, environmental, and socio-economic risks.

Coastal Engineering & Hybrid Protection Solution

IMDC provides end-to-end coastal engineering services—from site investigations and concept design to detailed design and construction support. We develop both hard and soft protection measures, optimising the balance between performance, sustainability, and adaptability.

Our expertise includes:

- **Design of seawalls, breakwaters, groynes, and revetments**
- **Dune rehabilitation, beach nourishment, and nearshore berms**
- **Numerical and physical modelling of waves, sediment transport, and morphology**
- **Harbour and coastal structure design, including scour assessment**
- **Integration of hybrid (grey–green) solutions and eco-engineering concepts**

By combining conventional civil engineering with ecological enhancement, IMDC ensures coastal protection solutions that are durable, flexible, and environmentally compatible.

Estuarine Systems Engineering & Adaptive Management

Estuaries are complex and dynamic transition zones where freshwater, tides, and sediment interact. IMDC applies advanced modelling and system-based management to maintain both ecological function and economic use.

Our services include:

- **Sediment management and beneficial use of dredged material**
- **Morphological modelling and estuarine system dynamics**
- **Design of tidal restoration and wetland creation projects**
- **Flood and tidal risk mitigation strategies**
- **Water quality and ecological habitat enhancement**

IMDC's multidisciplinary team supports estuary authorities, port managers, and environmental agencies in achieving balanced, adaptive management of estuarine systems.

Enhancing Resilience of Coastal & Estuarine Infrastructure

As climate pressures and population growth intensify, the resilience of coastal infrastructure becomes critical. IMDC helps clients design and retrofit assets to withstand and recover from hydrodynamic and climatic stresses.

Our services cover:

- **Structural resilience assessments and life-cycle design optimisation**
- **Integration of real-time monitoring and digital twins for asset management**
- **Development of resilience indicators and decision-support frameworks**
- **Design of multi-layered defence systems combining infra-structure, spatial planning, and ecosystem buffers**

These services enable operators, planners, and developers to secure long-term functionality and safety of ports, seawalls, flood defences, and urban waterfronts.

Key references

Complex project Kustvisie (Coastal Vision)

Country: Belgium
Year: 2017-2025
Client: Flemish Gouvernement

IMDC shapes the Flemish Coastal Vision 2100, preparing society for sea level. Through innovation and co-creation, we combine technical excellence with participatory work to safeguard the coast for next generations. Using advanced flood modeling and scenario planning, we assessed the impact of sea level rise. Together with over 100 stakeholders, we co-developed adaptive strategies that balance safety, ecology, and spatial.

Sustainable Development Goals

Flexible Disposal Monitoring Programm Western Scheldt

Country: Belgium & Netherlands
Year: 2010-ongoing
Client: Flemish Government, Department of Mobility and Public Works, Maritime Access Division

IMDC supports flexible sediment disposal in the Western Scheldt by monitoring and optimising dredging activities to enhance ecological value. We provide expert analysis, reporting, and modelling to guide long-term strategies and innovative dredging trials.

Sustainable Development Goals

West Africa Coastal Areas (WACA) Management Plan

Country: Benin, Ghana, Ivory Coast & Togo
Year: 2016-2017
Client: World Bank Group

IMDC played a key role in the World Bank's WACA Management Program, which addresses the rapid degradation of West Africa's coastal zones. IMDC helped six countries identify investment-ready projects and PPPs aligned with future developments. IMDC also supported governments in preparing compelling business cases, backed by quantitative cost-benefit and financial analyses.

Sustainable Development Goals

Al Numan Island marine consultancy

Country: Kingdom of Saudi Arabia
Year: 2024-2026
Client: Red Sea Global

IMDC is delivering marine engineering services for Al Numan Island. The scope includes marine planning, design, and early works, supporting the creation of a destination focused on wellness, culture, sustainability, and refined coastal living. This high-profile project showcases IMDC's expertise in shaping visionary waterfront environments with global appeal.

Sustainable Development Goals

Blankenberge-Wenduine

Country: Belgium
Year: 2017-2022
Client: THV SBE - Technum

IMDC conducted a feasibility study for the Flemish Government to address sedimentation at the harbour entrance of Blankenberge and beach erosion at Wenduine. Through advanced numerical modelling, IMDC evaluated the technical effectiveness, safety, cost-efficiency, and environmental impact of various coastal protection measures, providing a data-driven basis for sustainable coastal management and reinforcing IMDC's role as a trusted partner for complex coastal solutions. In the subsequent phases, the selected breakwater alternatives were further developed through detailed engineering design, focusing on structural stability, hydraulic performance, and constructability. The design included the definition of cross-sections, material gradations, and toe and crest configurations to ensure long-term functionality under North Sea conditions. IMDC also carried out Environmental Impact Assessment (EIA) studies and provided technical assistance during construction to ensure the works were executed in full alignment with the detailed design and environmental objectives.

Sustainable Development Goals

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