Annual Report 2011  
Coastal Systems and Engineering and Port Development  
Chair Group  
Head of Core: Prof. J.A. (Dano) Roelvink PhD

1  Core staff as of 31 December 2011

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Appointment (fte)</th>
<th>Research input (fte)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professors</td>
<td>Jan Adriaan (Dano) Roelvink</td>
<td>0.8</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Han Ligteringen</td>
<td>0.2</td>
<td>0.1</td>
<td>Since 1st of April</td>
</tr>
<tr>
<td>Associate Professors</td>
<td>Dr. Rosh Ranasinghe</td>
<td>0.5</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dr. Frank van der Meulen</td>
<td>0.4</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Senior Lecturers</td>
<td>Dr. Mick van der Wegen</td>
<td>0.8</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr. Ali Dastgheib</td>
<td>1.0</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr. Johan Reyns</td>
<td>1.0</td>
<td>0.6</td>
<td>Since 1st of November</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Ms. Poonam Taneja</td>
<td>0.2</td>
<td>0.1</td>
<td>Since 1st of April</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>4.5</td>
<td>2.8</td>
<td></td>
</tr>
</tbody>
</table>

2  Research and educational profile

2.1  Research lines

- Integrated modeling of coastal processes and evolution. The objective of this research line is to develop knowledge and modelling tools to predict hydrodynamic and morphological phenomena in the coastal zone, as a result of natural processes and human interference, directly and through climate change impacts. The focus is on improving long-term predictions of coastal morphology via process based, scale aggregated and probabilistic modelling and on developing open-source software for predicting coastal behavior, at various spatio-temporal scales.

- Performance and reliability of flood defense systems. Here the objective is to improve the understanding, models and techniques for the performance of coastal structures under variety of loading conditions and of flood defense systems including natural and man-made defences.

- Port development: traffic modelling, design of port master plans and expansion plans, adaptive port planning.

- Port-related hydrodynamic and morphological modelling.

2.2  Educational programme/specialisation for which the Core is responsible

- MSc Programme of Water Science and Engineering  
  - Coastal Engineering and Port Development specialisation

3  Major achievements

3.1  Research

- 1 PhD researchers graduated (Pushpa Kumara Dissanayake)
- Roshanka Ranasinghe’s collaborative research with TU Delft and Univ. of Queensland (Australia) resulted in the development of an innovative approach to determine economically optimal coastal setback lines;
- Mick van der Wegen extended his collaborative research with USGS into the San Joaquin/Sacramento Delta. The model is used as basis for the 1.3 MUSD CAscade 2 project;
- Dano Roelvink contributed heavily to further development of XBeach and its acceptance as an advanced tool for predicting storm impacts in complex situations;
Roshanka Ranasinghe was part of a consortium comprising Univ. of Sydney, Univ. of Wollongong and Univ. of Queensland (Australia) which was awarded AUD 650,000 by the Australian Dept. of Climate Change for an ambitious 3 year R&D project focussing on the development of a model framework for assessing coastal risk and adaptation to climate change on Australian coasts.

Roshanka Ranasinghe delivered 2 keynote presentations (Lisbon, Bangkok) in 2011.

3.2 Education

- Graduation of 7 MSc students in the specialisation Coastal Engineering and Port Development.
- Contribution to the supervision of many other MSc students in other programmes.
- Roelvink chairman of organizing committee of NCK Summerschool, Texel held in June 2011.
- Van der Meulen co-organizer (with Dept ER) of the international short course on Climate Change in Integrated Water Management and invited contributor/resource person to the international course on Flood Hazard Mapping at ICHARM, Japan.
- Initiation of a new online course based on Module 4 of the regular CEPD MSc course (Coastal Systems)
- Production of a video on the annual field based learning campaign at Vluchtenburg

3.3 Advisory/Capacity building projects

- Support of field research and morphological modeling at University of Ghana, funded by US Office of Naval Research in framework of Africa Partnership Station
- In PMR (project mainport Rotterdam) Van der Meulen was advisor to Rijkswaterstaat in the construction of new dunes in front of the Delfland coast, a coastal engineering work that was done to compensate the loss of valuable dune habitats as a result of MV2 (harbour extension Rotterdam). He was also chairman of the commisson that had the quality control over the report that gives the plan of action for future long term monitoring of the dunes in the context of PMR, and editor of the final report, in cooperation with Deltares.
- Van der Meulen advisor for Rijkswaterstaat to the governments of Mozambique, Swaziland and South Africa in DGIS project on integrated transboundary river basin management of the Incomati and Maputo Rivers.
- Completed Phase 1 of Climate adaptation study for the Govt. of Sao Tome/Principe. Projected funded via the Global Environment Facility and was undertaken in collaborating with Deltares. Phase 2 will be completed in 2012.
- Successful Symposium related to the UPARF funded CC-SIOTI project was held at AIT, Bangkok in July 2011. The Symposium proceedings have been published by AIT.
- Roelvink led a fact finding UNESCO-IHE/Deltares mission to Ivory Coast on the invitation of the Minister for Environment.
- Germany: Roelvink acted as International expert in review of Elbe Sediment Management Concept, Port of Hamburg
- NICHE proposal for developing CE and CZM curriculum at HWRU Vietnam (Van der Wegen and Ranasinghe)

3.4 Society

- Core members are active members of a number of professional organisations such as NCK, PIANC
- Ranasinghe member of National Committee of Coastal and Ocean Engineering Australia
- Ranasinghe professional member of Engineers Australia
- Core members provided a number (> 10) of peer reviews for reputed journals, research funding programmes
- Van der Meulen invited chairman in one of the sessions of the Policy Day on Water and Climate Change, organised by the University of Amsterdam.
- Van der Meulen member of the advisory committee of 2 large Management Authorities that manage the dunes of South- and North Holland Provinces.
- Roelvink is a member of Deltares Science Council
4 Research

4.1 Research projects initiated during 2011

- A model framework for assessing coastal risk and adaptation to climate change on Australian coasts, funded by the Australian Dept. of Climate Change.
- Development of a scale aggregated model to determine climate change driven coastline change along inlet interrupted coasts, funded by Deltares.
- Development of a design criterion for the shoreline response to submerged breakwaters via process based modelling, funded by Deltares.
- Mekong Delta research programme, Vietnam, funded by US Office of Naval Research.
- Bangladesh: MorphoFlood, development of long-term morphological models Meghna estuary with CEGIS and IWM.
- Long-term sediment transport dynamics and morphodynamics in San Francisco Bay Delta system (Van der Wegen).
- Levee development in tidal channel-shoal systems: theory and practice (Van der Wegen).

4.2 On-going research projects/activities (indicating partners, budget and funding source)

- Expert advice for Sandy Coast Dynamics research project at Flanders Hydraulics in collaboration with International Marine Dredging Consultants, Antwerp, Belgium.
- Analysis and modelling of Maasvlakte-II development of sandy coastal defence, funded by Boskalis.
- Modelling of suspended sediment during and after dredging operations, Khalifa, Abu Dhabi, funded by Boskalis.
- UPARF project CC-SIOTI in collaboration with CSIRO (Australia), Deltares, Univ. of Peradeniya and Univ. of Moratuwa (Sri Lanka), and AIT (Thailand). Currently 1 Msc at Univ of Moratuwa, 1 MSc at Univ of Peradeniya, 1 PhD at IHE. Projected extended to include an additional case study in VietNam (1 MSc at IHE to commence in 2012).
- Morphological upscaling with the MORFAC approach (MORFAC). Project funded by Deltares involving personell from Deltares, IHE and TUD. Currently 1 PhD at TUD.
- Modeling of infragravity waves on coral reefs, funded by Deltares, in collaboration with Univ. of Western Australia.
- Operational modeling of nearshore hydrodynamics and swimming safety, funded by Deltares.
- Modeling long waves in harbors, funded by Deltares.
- Predicting wave attenuation and morphological development at Corte Madera salt marsh, San Francisco Bay funded by USGS.
- UpaRF project Research on Sediment from Upstream to Estuary (ReSedUE), a collaborative project between CEPD and HERD, involving Deltares, 5 Chinese partners and HRI-Egypt.
- Long-term morphological modelling of Marsdiep inlet, funded by Deltares (PhD work Dastgheib) in framework of project ‘Coastline maintenance’.
- Hurricane impact modelling (XBeach), with Deltares, TUD, Univ. Miami, funded by Deltares, USGS and EU-MICORE.
- Long-term morphological modelling San Pablo Bay, funding by USGS.
- Impact of sea level rise on tidal inlets, funded by Delft Cluster.
- Generic Morphological Model, funded by Deltares.
4.3 List of on-going and new PhD research projects

<table>
<thead>
<tr>
<th>PhD fellow, country</th>
<th>Promotor(s)</th>
<th>Title research project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Qinghua Ye</td>
<td>J.A. Roelvink</td>
<td>Development of a Generic Geomorphological Model with applications to Tidal Sand Bank Behavior</td>
</tr>
<tr>
<td>2 Ali Dastgheib</td>
<td>J.A. Roelvink</td>
<td>Long-term interaction of morphological changes in a multi-inlet tidal system: The Dutch Wadden Sea</td>
</tr>
<tr>
<td>3 Wan Yuanyang</td>
<td>J.A. Roelvink</td>
<td>Sedimentation processes Yangtze estuary</td>
</tr>
<tr>
<td>4 Guo Leicheng</td>
<td>J.A. Roelvink, M. Van der Wegen</td>
<td>Morphodynamic modeling of the Yangtze Estuary</td>
</tr>
<tr>
<td>5 Mohamed Shahrizal Ab Razak</td>
<td>J.A. Roelvink</td>
<td>Modeling of Headland Sediment Bypassing Process &amp; Nearshore Evolution of Embayed Beach</td>
</tr>
<tr>
<td>6 Duong Minh Trang</td>
<td>R. Ranasinghe, J.A. Roelvink</td>
<td>Climate Change impacts on Small Tidal Inlets</td>
</tr>
<tr>
<td>7 Leo Sembiring</td>
<td>J.A. Roelvink</td>
<td>Operational modeling of swimmer safety and coastal erosion</td>
</tr>
<tr>
<td>8 Gerard Dam</td>
<td>J.A. Roelvink</td>
<td>Towards reliable modelling of alluvial estuaries</td>
</tr>
<tr>
<td>9 Fernanda Minikowski Achete</td>
<td>J.A. Roelvink</td>
<td>Long-term morphodynamics of San Francisco Bay</td>
</tr>
<tr>
<td>10 Li Shouqian</td>
<td>Lu Yongjun (NHRI, China), J.A. Roelvink</td>
<td>Wave-current boundary layer in alluvial sediment</td>
</tr>
<tr>
<td>11 Zuo Liqin</td>
<td>J.A. Roelvink, Lu Yongjun (NHRI, China)</td>
<td>Wave-current boundary layer in alluvial sediment</td>
</tr>
<tr>
<td>12 Mario Duarte Duque</td>
<td>J.A. Roelvink</td>
<td>Design criteria for coastal cities</td>
</tr>
</tbody>
</table>

4.4 Research output

1. PhD theses

2. Academic publications
   2.a1 In refereed journals (A – category)
   - D. M. P. K. Dissanayake, R. Ranasinghe and J. A. Roelvink. The morphological response of large tidal inlet/basin systems to relative sea level rise, Climatic Change DOI: 10.1007/s10584-012-0402-z.


2.a2 In refereed journals (B – category)


Kellens W., Neutens T., Deckers P., Reyns J., De Maeyer Ph. Coastal flood risks and seasonal tourism: analysing the effects of tourism dynamics on casualty calculations. Natural Hazards. DOI: 10.1007/s11069-011-9905-6

2.a3 In refereed journals (C – category)


2.a4 Guest editorships special issues refereed scientific journals

2b In other journals

2.c1 Book chapters in refereed books (A – category)


2.c2 Book chapters in refereed books (B – category)

2.c3. Book chapters in refereed books (C – category)

2.d1 Monographs
2.d2 Editorships scientific books

2.e Proceedings (full papers only)


R. Ranasinghe, 2011. Climate change impacts on small tidal inlets: Why and How? (Keynote lecture) - Proceedings of Symposium on Climate Change Impacts on Small Tidal Inlets 2011, Bangkok, Thailand, pp. 1-4


2.f Scientific reports ordered by an external contractor

3. Professional publications and products (incl. IP)

4. Publications for the general public (optional)

5. Other results of scientific esteem and acknowledgement

6. Unpublished conference papers

Van der Wegen M., B.E. Jaffe and J. A. Roelvink, Process-based morphodynamic modeling: hindcast and forecast of decadal erosion and sedimentation patterns in San Pablo Bay, CERF, Daytona Beach

Guo Leicheng, He Qing, Dano Roelvink and Mick van der Wegen, Morphodynamics of the tidal flats in the Yangtze Estuary, InterCoh, 2011, Shanghai, China.

Guo Leicheng, Dano Roelvink, Mick van der Wegen and He Qing, Modeling the long-term morphodynamic behavior of the Yangtze Estuary, IAHR conference RCEM, 2011, Beijing, China.

Patrick L. Barnard, Noah Knowles, David Schoellhamer, Neil Ganju, Bruce Jaffe and Mick van der Wegen, Modeling the physical impacts of climate change in San Francisco Bay, State of the San Francisco Estuary conference 2011, Oakland, CA, USA


5 Education

5.1 Modules of the Master programmes and specialisations coordinated by the Core

<table>
<thead>
<tr>
<th>Programme</th>
<th>Name of module</th>
<th>Date offered</th>
<th>Name of coordinator</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSE-CEPD</td>
<td>All modules (# 3-15)</td>
<td>All year.</td>
<td>M. van der Wegen</td>
</tr>
</tbody>
</table>

5.2 Regular short courses coordinated by the Core in 2011

<table>
<thead>
<tr>
<th>Topic</th>
<th>Coordinator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online – course on Integrated coastal zone management</td>
<td>R. Ranasinghe</td>
</tr>
<tr>
<td>Integrated coastal zone management</td>
<td>M. van der Wegen</td>
</tr>
<tr>
<td>Coastal systems</td>
<td>D. Roelvink</td>
</tr>
<tr>
<td>Coastal and port Structures I</td>
<td>A. Dastgheib</td>
</tr>
<tr>
<td>Coastal and port Structures II</td>
<td>A. Dastgheib</td>
</tr>
<tr>
<td>International port seminar</td>
<td>A. Dastgheib</td>
</tr>
<tr>
<td>Morphological modeling using Delft3D</td>
<td>D. Roelvink, M. van der Wegen</td>
</tr>
</tbody>
</table>

5.3 MSc theses finalised during 2011

<table>
<thead>
<tr>
<th>Name student</th>
<th>Title thesis</th>
<th>Sponsor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampiaw</td>
<td>Capacity Study of Land and Waterside Infrastructure for the Port of Takoradi, Ghana</td>
<td></td>
</tr>
<tr>
<td>Castañeda Di Natale</td>
<td>Analysis of Erosion and Sedimentation near Salaverry Port, Peru</td>
<td></td>
</tr>
<tr>
<td>Hadi Syafitri Noor</td>
<td>Study of Sedimentation Behavior in Tanjung Priok Harbour, Indonesia</td>
<td></td>
</tr>
<tr>
<td>Iryansyah</td>
<td>Analyzing of Port Capacity of Tanjung Priok Port, Indonesia Using Harboursim Simulation</td>
<td></td>
</tr>
<tr>
<td>Kivshany</td>
<td>Improving the Efficiency of Flexible Fall Pipe Offshore Operation</td>
<td>Van Oord</td>
</tr>
<tr>
<td>Ortega Heredia</td>
<td>Analysis of the re-suspension of fine sediment due to dredging and storm induced effect. Case study The Port of Khalifa, Abu Dhabi, UAE</td>
<td>Boskalis / Deltares</td>
</tr>
<tr>
<td>Risandi</td>
<td>Morphological Response of Maasvlakte 2 Soft Defences using 2 Dimensional Xbeach</td>
<td>Boskalis</td>
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