Complex coastal systems

transdisciplinary learning on international case studies

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Colophon

COMPLEX COASTAL SYSTEMS
TRANSDISCIPLINARY LEARNING ON INTERNATIONAL CASE STUDIES

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Preface

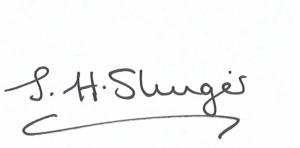
The project Co-designing Coasts using natural Channel-shoal dynamics (CoCoChannel), funded by the Dutch Research Council (NWO), commenced in 2015 with the broad aim of increasing knowledge on the nested scale behaviour of inlet and estuary coasts. The Texel inlet on the Dutch Wadden Sea coast was selected as the central case study of the project with two of the three sub-projects focussing here. The other sub-project, Multi-actor Systems - Co-Designing Nature-based interventions in Coastal Systems, under the leadership of Delft University of Technology, undertook the development of a co-design approach on Texel, but also initiated an international cross-comparative study to anchor the knowledge development within international experience.

Seven case studies located in South Africa, Sri Lanka, California, Suriname, Ireland and the Netherlands (2x) form the objects of inquiry. The case studies, focussing on tidal inlet or estuary mouth management issues, were selected to provide learning on the biophysical and the social systems. For this reason each of the authors invited to contribute a chapter and engage in a week-long workshop was deeply familiar with their specific case study. The workshop, convened in September 2017, was designed to facilitate transdisciplinary learning through consecutive divergent and convergent knowledge exchange phases. This book documents the learning from this international cross-comparative component of the CoCoChannel project.

This book is intended for:

- Transdisciplinary scholars who are interested in interdisciplinary learning and knowledge exchange,
- Policy analysts, environmental historians and coastal policy specialists who are interested in the role of science in the evolution of coastal policy and management,
- Coastal scientists and engineers interested in the dynamics of tidal inlets and estuary mouths,
- Coastal managers looking to learn about tidal inlet and mouth management practices,
- Educators focussed on interdisciplinary skills or interested in using the case studies in coastal, management and engineering classes or as the basis for problem structuring exercises by policy students, and
- Students interested in coastal systems management and wanting to broaden their interdisciplinary competence.

Enjoy learning from the reflective experience of the scientists involved in this transdisciplinary learning endeavour!



Authors

The authors contributing to this transdisciplinary endeavour draw upon a broad spectrum of scientific backgrounds ranging from engineering, through the biophysical sciences to the policy sciences. They include (in alphabetical order): Janine Adams (Nelson Mandela University), Dane Behrens (Environmental Science Associates), David Dann (University of California, Davis), Trang Minh Duong (IHE Delft, Netherlands), Filipe Galiforni Silva (University of Twente, Netherlands), Kate Hewett (University of California, Davis), Floortje d'Hont (Delft University of Technology, Netherlands), Piet Huizinga (formerly CSIR, South Africa), Michael Koohafkan (California Department of Water Resources), Stephen Lamberth (Department of Environment, Forestry and Fisheries, South Africa), John Largier (University of California Davis, USA), Suzanne Linnane (Dundalk Institute of Technology, Ireland), Declan MacGabhann (), Priscilla Miranda (Staatsbosbeheer, Suriname), Jan Mulder (University of Twente, Netherlands), Rosh Ranasinghe (IHE Delft, Netherlands), Matt Robart (University of California, Davis), Robin Roettger (University of California, Davis), Alec Rolston (Dundalk Institute of Technology, Ireland), Jill Slinger (Delft University of Technology, Netherlands), Susan Taljaard (CSIR, South Africa), Ad van der Spek (Deltares, Netherlands), Mick van der Wegen (IHE Delft, Netherlands), Lara van Niekerk (CSIR, South Africa), and Kathelijne Wijnberg (University of Twente, Netherlands).

Editors

Prof. dr. Jill Slinger

Prof. dr. Jill Slinger is an interdisciplinary specialist focussing on the contribution of inclusive, participatory processes in the environmental management of water and coastal systems. She holds a faculty appointment at Delft University of Technology and an honorary visiting professorship at Rhodes University, South Africa. She currently serves on the Netherlands Centre for River Studies Programme Committee and the Coastal Working Group of the Dutch Expertise Network for Flooding Safety. Dr. Slinger has published in water, coastal, environmental science, policy, planning and engineering journals. She has undertaken research on the southern African coast, the Incomati and Volta Deltas, the Scheldt Estuary, the Rhine River and the North Sea coasts of the Netherlands, England, Scotland, Belgium, Germany and Denmark. She has an ongoing involvement in pan-European and African research projects related to environmental systems management, participatory planning and design. Her current research activities focus on using ecosystem-based design knowledge to support the interactions between people, science and policy in river and coastal systems – an inclusive co-design approach to planning and management.

Dr. Susan Taljaard

Susan Taljaard is a marine, coastal and estuarine researcher in the Coastal Systems Research Group of the CSIR, South Africa. Her research has been shaped by the CSIR's mandate to foster science that contributes to the quality of life of South Africa's people, in collaboration with the private and public sectors. She has developed water quality guidelines and operational policies for marine disposal of land-derived wastewater, both nationally and internationally through the Benguela Current Large Marine Ecosystem Programme, as well as the Western Indian Ocean Land-based Activities Programme. In 2014, she was project leader of the CSIR's team that assisted the national environmental authority with the development of South Africa's first National Coastal Management Programme under the Integrated Coastal Management Act. Her research outputs focus on the implementation of environmental policies, protocols and guidelines for sustainable growth and development. Her recent appointment as Adjunct Professor at the Institute for Coastal and Marine Research, Nelson Mandela University, offers her the opportunity to share her transdisciplinary insights and learn from the next generation of marine and coastal scientists.

ir. Floortje d'Hont

Floortje d'Hont is in the final year of her PhD in the Policy Analysis section of the Faculty of Technology, Policy and Management of Delft University of Technology. She holds a MSc degree in Systems Engineering, Policy Analysis and Management from the same faculty. Her research is funded by the CoCoChannel (Co-designing Coasts using natural Channel-shoal dynamics) project and focuses on design-oriented collaborative activities that promote innovative solutions for coastal systems. She has drawn on her teaching and student supervision experience to design, analyze and report on stakeholder engagement and expert workshops. She is particularly interested in methods to support creative collaboration between citizens, experts, scientists, and governmental actors.

ir. Aashna Mittal

Aashna Mittal is a graduate from TU Delft with a Master's in Engineering and Policy Analysis cum laude. She has an academic background covering diverse domains such as engineering, liberal arts, and policy analysis. Her Master's research focussed on the potential of a community-based approach to groundwater management in peri-urban areas of India. Throughout her Master's, she was actively involved in teaching activities at the faculty of Technology, Policy, and Management at TU Delft. Continuing this interest forward, she is currently supporting the development of a new MOOC called Beyond Engineering: Building with Nature, and the editorial work of this book.

Reviewers

The reviewers attended the final public presentations (on 28th September 2017) that concluded the week-long workshop. They did not participate in the preceding discussions and transdisciplinary learning on which the final presentations were based. As such, they were familiar with the workshop outcomes, and through this and their individual experience in the fields of policy analysis and environmental management, were well positioned to review the methods, system understanding and learning that occurred through the transdisciplinary engagement of scientists with a range of international case studies.

Prof. (em.) dr. ir. Wil Thissen

Wil Thissen is emeritus Professor of Policy Analysis at the Faculty of Technology, Policy and Management of Delft University of Technology, where he pioneered the development and realisation of the teaching and research program in Systems Engineering, Policy Analysis and Management. He has served as an editorial board member of Technological Forecasting and Social Change, Impact Assessment and Project Appraisal, and The Environmental Impact Assessment Review, and has authored many scientific papers and books. His research interests are in developing and testing concepts and methods for supporting strategic policymaking in multi-actor environments, with particular emphasis on applications in the fields of infrastructure, energy policy and environmental and water management. Recently, he has developed a strong focus on working in the water and environmental management field in partnership with actors in developing countries, including Bangladesh, India, Indonesia, Rwanda, Suriname and Senegal.

Dr. ir. Heleen Vreugdenhil

Heleen Vreugdenhil is an innovation specialist in the Marine and Coastal Systems Department of Deltares in the Netherlands. Her PhD from the Delft University of Technology focussed on pilot projects in water management, analyzing their effects on changing management practices along the Rhine River in Switzerland, Germany and the Netherlands. After a post-doctoral period at the University of Maastricht in which she analyzed stakeholder engagement processes from national to local level, she joined Deltares where she currently employs her systems analysis skills to engage in the public domain and advance nature-based, participatory planning approaches. She complements these environmental management and innovation activities by a strong reflective focus through her part-time employment in the Policy Analysis Section of Delft University of Technology.

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Contents

1

Introduction

By Jill Slinger, Susan Taljaard and Floortje d'Hont

1.1. Background

This book captures the learning from a cross-comparison of seven international inlet or estuary mouth management situations. The conceptual framing is provided by a focus on systems knowledge and its development and use within coastal management. Systems and systems knowledge have been described as holistic, embodied ways of conceptualising reality, forming "both a way of inquiry and an object of inquiry" (Nelson, 2008). To date there has been little research focussing on the role of systems approaches in informing coastal management despite the early development of systems thinking (late 1950's onwards) (Ison et al., 1997), the general acceptance of the adaptive learning cycle of integrated coastal management (Group of Experts on the Scientific Aspects of Marine Environmental Protection [GESAMP], 1996; Olsen et al., 1999), and ongoing engineering infrastructural and urban development along our coasts. Recently, Reis et al. (2014) undertook a study on systems approaches for implementing integrated