Deltas in Depth scientific sessions		
Deltas in Depth 4. Coastal Systems and Wetlands		
DD 4.3 Sustainable deltas 2015 (SD2015) initiative		
Chair	Hartwig Kremer, The UNEP GEMS/Water Programme (UNEP Headquarters), Division of Early Warning and Assessment, DEWA, Nairobi, Kenia	
Presentations	•	Irina Overeem, Community Surface Dynamics Modeling System, University of Colorado at Boulder, USA
	•	Prof. Efi Foufoula-Georgiou, University of Minnesota, USA
	•	Renske Peters, Director of Delta Alliance, the Netherlands
	•	R. Ramachandran, Chair LOICZ, Germany

The State of deltas in times of climate change: Challenges and opportunities in data collection and integrated delta modeling, Irina Overeem, Community Surface Dynamics Modeling System, University of Colorado at Boulder, USA

Discussed challenges for delta models, associated with obtaining data (present and historical) of suitable quality and that can be integrated and be run at different temporal scales. She discussed the iRODS system for sharing data and the CSDMS web modelling tool (http://csdms.colorado.edu/wiki/WMT_portal) that was developed to fill the needs for a tool that is transparent, sufficiently complex, but useable. (University of Minnesota provides training in a summer school for using the web modelling tool). She noted that there should be feedback between the data domain and policy/users on what data should be input to models.

Belmont Forum Deltas Project (BF-DELTAS) – to sustain the resilience of deltas, Prof. Efi Foufoula-Georgiou, University of Minnesota, USA

Deltas are complex: delta studies require integration of many sciences, as well as socio-economic and policy data. The key questions being addressed by the Belmont Forum deltas project (http://delta.umn.edu/) are focused on assessing delta vulnerability. The major work packages are (i) advancing science on resilience and sustainability of deltas; (ii) developing a framework for risk assessment and decision support; (iii) building a repository of data sets including physical, and socio-economic data; (iv) developing Global Delta Vulnerability Indices (v) implementing studies in selected deltas with local partners.

The project has several existing highlights, focused on (i) delta network analysis and vulnerability; (ii) physical and analytical models; (iii) Historical trends in demographic and bio-physical data; (iv) climate-human-landscape coupling; (v) global vulnerability indices; stakeholder partnership. SD2015 will provide a statement of the urgency for global awareness (thinking big and influencing funding). It will (i) provide a mechanism to bring people together and support collaboration; (ii) contribute to developing a central repository for data; (iii) sponsor lectures and run science museum exhibits and public meetings.

Delta Alliance - for the resilience of deltas worldwide, Renske Peters, Director of Delta Alliance, the Netherlands

Delta Alliance (DA; www.delta-alliance.org) contributes to sharing knowledge. DA can (i) reduce overlap and build capacity; (ii) find solutions to delta vulnerability; (iii) ascertain how to improve resilience using data collected by partners. DA has global partnership and brings together the private sector and government. Its three main activities are (i) brokering between partners; (ii) compiling

information and making it accessible for different users around the world; (iii) network development. Outputs include knowledge sharing by publications; identification of knowledge gaps; development of a toolbox for adaptive delta management. Questions from DA for the SD2015 are: how do we launch SD2015 and build momentum? What are our outputs and audience?

Land-Ocean Interactions in the Coastal Zone (LOICZ) – A Focus on the resilience of deltas worldwide, R. Ramachandran, Chair LOICZ, Germany

Deltas are economically important; environmentally vulnerable; and highly impacted. LOICZ (http://www.loicz.org/) is studying several deltas, with analyses including: nutrient budget models (200 sites in the LOICZ database); ecohydrology based management; high energy systems and declines in large scale sediment inputs; landuse change in deltas; human impact and subsistence impacts; storm surges and floods. LOICZ's possible role in SD2015 would in developing global partnerships and linkages.

Recommendations for SD2015 based on the discussion:

1) What are our objectives for 2015/2016?

- What is our vision – to find solutions for sustaining all deltas, or identify where we need to adapt? Do we preserve all delta areas regardless of status, or do we do triage and develop policies focused on preserving areas only where we have a high capacity of success (Efi Foufoula-Georgiou). SD2015 should help us focus on priorities so we can increase resilience.
- We must accept inevitable change and be ready to adapt to it rather than try to change it. E.g. it would be better to plan democratic shifts in behavior to adapt to unavoidable coastline change (John Day). However, behavioral shifts can be difficult. For example, populations in many developing countries cannot move away from deltas because they need to be physically located there for economic regions. In these cases it is important to provide the data for the best economic decisions (Cees van de Guchte).
- Important to think at local and national levels. How do we address large drivers of change? How do we develop plans/governance for the future, to ensure people are not affected in 20-50 years? (Diop, Senegal)
- Important to think carefully about how to interpret the results from our models and make recommendations that encompass adaptation to changes in populations and land use (Irina Overeem). SD2015 should do adaptive planning now for objectives 10 years ahead (Renske Peters).
- SD2015 should still look at how to restore deltas when possible, and create action for their sustainability (Ramesh Ramachandran).
- Provision of a suite of place-based success stories about deltas would be useful, written by people who know the place/issues well. We use these to draw lessons of success. E.g. Global Environmental Outlook for Small Island States asked the questions about looking to the future, connection nature, successful solutions, and lessons learned. " People responded well to the published results (Hartwig Kremer).
- SD2015 can provide decision-makers with the information they need for effective delta management. For example, UN organisations need delta practitioners to advise them on delta management, so they can apply this information to best decisions for management of their own deltas.
- A key objective is how we present information and solutions meaningfully and usefully to policy makers.

2) How do we integrate with Sustainable Development Goals?

- Most of the existing 17 SDGs are, in some way, applicable to managing deltas. We must ask: "are deltas sustainable in the long term or are they not?" Some deltas may not be sustainable; so we must think carefully about recommendations for effective delta management (Hartwig Kremer).
- SD2015 must identify metrics for measuring progress towards SDGs (Ian Harrison).
- Scientific analyses of the environment must be put into the context of human development.
- SD2015 should provide the scientific basis to help policy decisions that are most effective. We must provide the science to inform the right decisions based on the different available scenarios.
- People have discussed the "cost for sustainability" but we must realize that sustainability is an investment; sustainability should be cost effective, otherwise it is not 'sustainable' (WWF Spain). Hartwig Kremer responded that the transition to green economies does have a cost; but it is the same as investment.

3) How do we link up with partners

- It is important to create a scientific basis for our decisions; translating this knowledge into action is critical. We should not think of SD2015 as principally a network of people; it is a process of providing data to inform decisions (Cees van de Guchte).
- A key objective is how we present information and solutions meaningfully and usefully to policy makers.
- SD2015 must avoid duplicating existing efforts. There is also an absence of people doing natural science on the ground, which needs to be addressed (John Day). Efi Foufoula-Georgiou responded that while people are doing work on deltas, this is regional and in a non-integrated way. There is a need to integrate these into a global analysis that can achieve complementary methods and comparable data.

5) Assessments – what are we going to assess? What are the biophysical boundaries in terms of food and water etc. that define deltas in time and space and how are they being affected/changed.

- Sustainability of deltas must be based on practical assessment of the effects of sea level rise. (John Day)
- Studies need to include complex population changes that accurately represent the complexities of the future for make delta management.
- SD 2015 delta studies must be coordinated with whole basin strategies to account for upstream effects (WWF Spain).
- We need scientific evidence to inform best socio-economic decisions (Hartwig Kremer). SD2015 should give the information to allow stakeholders to make the best solutions (Ian Harrison).