

Estproc

memo

To : Workshop participants
Richard Whitehouse
Alison Houghton
From : Mindert de Vries
Subject : Summary of workshop results
Date : January 29, 2003
Cc : Andries Roelfzema
Action: See text

On December 20, 2002, Delft Hydraulics organised a workshop in order to exchange our ideas on modelling of bio-geomorphological interactions, data analysis and improvement of data availability within the framework of the ESTPROC project. The workshop was scheduled for one day, in the Delft Hydraulics office. This document contains prints of the presentations as annexes.

Attendants:

A. Luijendijk, D. Roelvink, I. Tanczos, M. de Vries, Z.B. Wang, H. Winterwerp, (Delft Hydraulics)
T. Bouma (NIOO-CEME)
S. Temmerman (University of Leuven, Belgium)
J. Spearman (Wallingford)
I. Moeller, T. Spencer, R. Turner (CCRU)
N. Booij (DH)
Students: Arjan Mol, Linda Kusters

Presentation of (results of) relevant field and laboratory experiments in NL and UK

- The Paulinaschor and wave flume experiments, T. Bouma

(Note that 'schor' means 'saltmarsh' in Dutch)

Tjeerd Bouma presented an overview of joint activities executed by NIOO_CEME, Delft Hydraulics concerning field experiments on Paulinaschor and wave-flume experiments in Delft Hydraulics facilities. This work falls within the global research objective of his group, to study the spatial relationships between physical and biological parameters in estuaries and coastal areas. See Annex 1. The work of NIOO-CEMO is not financially related to ESTPROC.

The work of NIOO-CEME on sedimentation and erosion in artificial tussocks of vegetation could be relevant to John Pathick in the Humber.

- Paulinaschor work by the University of Leuven, S. Temmerman
Stijn Temmerman presented his PhD work on measuring and modelling the sedimentation and geomorphic changes in tidal marshes of the Scheldt estuary. Especially his dataset for Paulinaschor is very useful to help calibrate models on sediment transport and bathymetry changes in relation to height, vegetation density and distance to creeks. See Annex 2.
This work is not financially related to ESTPROC.
- The Stiffkey and Dengie experiments, I. Moeller
Iris presented the field data and the analysis of these data. From this Iris would like to proceed with model calibration and validation. For this she is interested in clarification of the vegetation and bed roughness and the effect of cliffs on wave parameters. See Annex 3.
- Relevance of fluid-sediment interactions on mudflats, H. Winterwerp
Han presented data and model results that clarify the process of sediment induced turbulence damping and bed roughness change. Han discussed the Krone-formula, suggesting that no critical shearstress for sedimentation exists. He therefore suggests that deposition rates based on

Krone are not correct. In Paulinaschor near bed turbulence measurements were executed. Data still have to be interpreted. See Annex 4.

- Morphodynamic modelling of the Humber estuary, D. Roelvink
Dano presented the present state-of-the-art for the Humber project. At present the model seems to be reasonable correct in predicting channel dynamics in certain parts of the Humber. The model does not contain any biological processes such as sediment (de)stabilisation by zoobenthos or algae.
- Modelling interaction of vegetation with waves, currents and sediment transport, A. Lujendijk
Arjen presented the calibration of a k-epsilon vegetation model to current flume data. The model was later applied to a coastal area including a seagrass bed. This model application illustrates the effect of submerged vegetation on sediment transport and therefore sediment stability. The influence of vegetation on waves is modelled with SWAN. This aspect will be further researched in the near future. See Annex 5.
- Influence of vegetation on waves, N. Booij.
Nico discussed the possibilities to include the effect of vegetation in SWAN. He suggested to use the Madsen friction coefficient. Furthermore, the HISWA-code for influence of reed-stalks could be added. See Annex 6.

Discussion topics

- Wave attenuation
CCRU and Delft Hydraulics will cooperate on application and calibration of SWAN to field data for mudflats and saltmarshes. Nico Booij will assist and advise. This activity will be executed in February/March 2003. A list of required data will be provided to CCRU by Delft.
- Sedimentation rates
The possibility to use the valuable dataset on sedimentation rates in saltmarshes of Stijn Temmerman was discussed. It was agreed to try to utilise these data for calibration of the D3D sediment-online model application for the Paulinaschor. Also Stijn is proceeding with his own finite elements model. He is invited to work for some time in Delft to get some experience with the D3D model application.
The possibility to introduce the proposed adaptation of the Krone sedimentation-rate formulation of Han Winterwerp was mentioned. No specific actions will be taken until the return of Han from the USA in April.
- Spatial scales
Paulinaschor modelling and measuring work is executed on a very detailed scale. The parameterisation of processes on this scale to the whole estuary scale is to be studied. In this way, possibilities can be created to enhance the biology content for projects such as the Humber application of Dano Roelvink, or ESTMORF/ASMITA projects of Z.B. Wang.
- Modelling biogeomorphology
Topics for further analysis are: the relation between vegetation roughness and waves. Important question is how to schematise the vegetation in the model in relation to stiffness or plant structure. Furthermore the effect of morphology characteristics such as steep cliffs in saltmarshes to waves is not well known. The effect of seasonal biological changes in for example vegetation density and height, understanding sediment composition in relation to benthos.

- Need for additional monitoring
Spending money on data mining could be worthwhile. However the group also agrees that add. monitoring of waves for instance on the Humber mudflats such as Skeffling is needed. Executing current and sediment transport measurements in Dengie is considered a useful exercise. This will create a dataset very complementary to the Paulinaschor data. Also the possibilities to try to find additional funding outside ESTPROC was discussed. We will be looking out for this, especially EU-FP6 could provide a chance (ECOZONE??. CoastWetNet??).

Next steps to be taken in ESTPROC

- SWAN-model application to Paulinaschor and Dengie saltmarsh
Delft Hydraulics and CCRU will develop a 1D-Horizontal SWAN schematisation in cooperation with Nico Booij.
This result in a sensitivity analysis for a situation with and without vegetation. The density and height of vegetation will be varied. We will use astronomical tides as forcing. Field and lab data will be used to calibrate SWAN. We will start with using Madsen-roughness to translate plant parameters into the SWAN model. Arjan Mol, Linda Kusters, Tjeerd Bouma and Rosalind Turner will work on this subject. *Possibly Nico will introduce the reeds-code of HISWA into SWAN.*
- Sediment transport modelling
Delft will start with a D3D schematisation of a 'conceptual' mudflat-saltmarsh. We will use this schematisation to perform a sensitivity analysis on hydraulic and morphological parameters in relation to vegetation density, -height and -distribution. We will have Linda Kusters and Ilka Tanczos working on this. PhD student Tjaard vd Meulen will be involved. We will invite ESTPROC experts to discuss results of this approach in May/June (Uncles, Widdows, ..).

Planned Activities

- CCRU – Wallingford will proceed with wave research work on unvegetated mudflats
- CCRU – Delft Hydraulics – NIOO will proceed with SWAN modelling for salt marsh vegetation for two weeks in February/March 2003.
- Delft Hydraulics will proceed full speed with sediment transport model of a conceptual mudflat-saltmarsh.
- Presentations made during this workshop will be provided in digital form for inclusion in ESTPROC website.

Closing remarks

Tom Spencer: We don't want to lose momentum. We are involved in executing very useful activities. It is a challenge to keep balance between all the elements of the ESTPROC project.

Iris Moeller: Useful progress could be made by mining of existing datasets of Paulinaschor and Dengie. How does SWAN perform with steep marsh cliffs? Should a different model be considered?

Mindert de Vries: Thanks for attending the workshop. We had good discussions and I look forward to our future cooperation.