



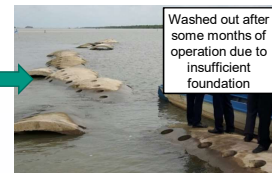
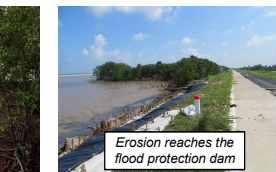
# ViWaT-ENGINEERING



## COASTAL PROTECTION AND LAND RECLAMATION

### Coastal erosion – A complex problem

- ◆ Loss of up to several 100 m in the last decades
- ◆ Accompanied by the loss of protective mangrove forest
- ◆ Reduced sediment input to the sea due to dams and sand excavation in the Mekong river
- ◆ Attempts with different protection measure concepts partly failed



### Various requirements to a suitable structure

- ◆ Stop the coastal erosion by enforcing wave energy dissipation
- ◆ Enable land reclamation by sedimentation of suspended solids
- ◆ Provide suitable ecosystem conditions for mangrove replantation
- ◆ Efficiency regarding construction costs and building materials

- ◆ **Main aim:** Development of a suitable coastal protection structure adapted to the local conditions
- ◆ **Scientific approach:** Combination of numerical and physical models supplemented by field investigations

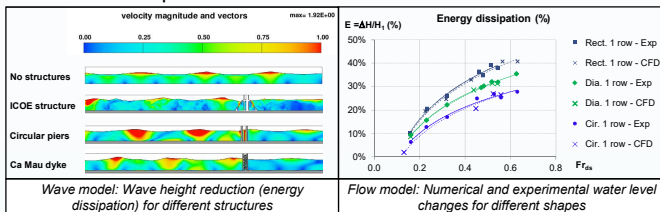
### Numerical modelling

#### Wave model:

- ◆ Systematic analysis of relevant parameter sensitivities (wave height, wave type, wave period, water depth, current...).

#### Flow model:

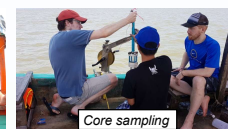
- ◆ Assessing drag coefficients for different existing and idealized structure shapes



Model input parameter

Verification of results

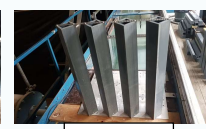
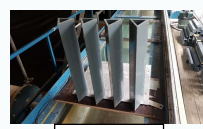
### Measurement campaigns



- ◆ Assessment of local wind, current, bathymetry and turbidity data
- ◆ Closing of existing gaps in knowledge
- ◆ Essential information for definition of design conditions

### Experimental modelling (Hydrolab)

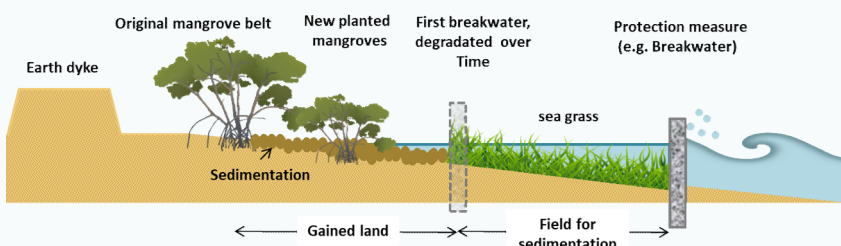
- ◆ Validation of numerical results
- ◆ Flow model in a hydraulic flume (scale 1:5)
- ◆ Wave experiments (flume and basin) are planned



Joint decision to propose a suitable structure based on multi criteria analysis considering efficiency for energy dissipation and land reclamation, mangrove ecology, foundation stability, economic aspects, and availability of construction materials

### Pilot implementation

- ◆ Combination of hard engineering structures and soft biological measures
- ◆ Implementation planned until 2021



### Acknowledgements

The ViWaT-Engineering project (02WCL1474A-H) is funded by the German Federal Ministry for Education and Research (BMBF). Our Vietnamese partners under the leadership of the Ministry of Science and Technology (MOST) are gratefully acknowledged for their support.



### Contact

For further information please visit [www.viwa.info](http://www.viwa.info) or contact us at KIT: Prof. Dr.-Ing. Franz Nestmann ([franz.nestmann@kit.edu](mailto:franz.nestmann@kit.edu)), Dr. Moritz Zemann ([moritz.zemann@kit.edu](mailto:moritz.zemann@kit.edu)), Dr. Vu Duong ([hoang.vu@kit.edu](mailto:hoang.vu@kit.edu)), Dr. Nicolas Börsig ([nicolas.boersig@kit.edu](mailto:nicolas.boersig@kit.edu)).