

BAM Infraconsult bv

Results from the Dutch ECOBEACH Pilot Project

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References: RWS/BAM (2013)
Ekkelenkamp (2011)
Pieterse (2009)

Investigations for a natural stabilization of the coast
Drainage Tubes versus Sediment
The Influence of an Eco Beach PEM in Beach Development



INTRODUCTION

Eco Beach is an innovative vertical passive beach drainage system discovered by accident by the Danish contractor Poul Jakobsen in the early 1990's. The invention was initially called "Pressure Equalizing Module System". The inventor indicated a positive effect on natural accretion and reduction of erosion of the beach.

The demonstrated positive results at different pilot projects around the world triggered the Dutch contractor BAM to set up a test of the system at the beach of Egmond aan Zee, along the Dutch North Sea coast, in cooperation with Rijkswaterstaat (Dutch Ministry of Public Works). This pilot, which was called Eco Beach, was carried out between 2007 and 2011. The system was installed in 2 sections of each 3 km length at the Dutch test site.

TEST SETUP OF THE DUTCH PILOT

The system consists of vertical drainage tubes with a length of 1.75 m which are installed between the high and low waterline at 0.25 m below the beach surface. The tubes are placed with an interspacing of 10 m in cross-shore rows, while the long-shore distance between the rows is 100 m.

RESULTS

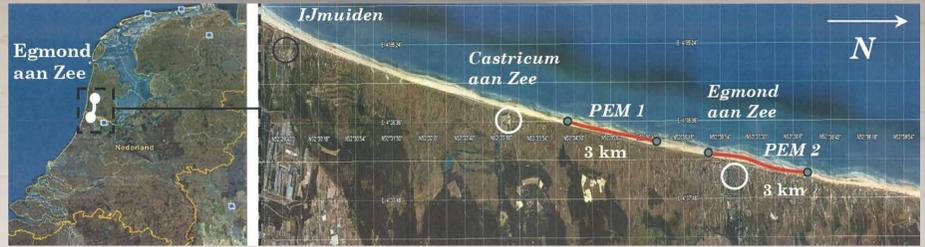
Both statistical analysis and scientific research were carried out. The statistical analysis led to the highest beach volume ever at the southern test area (since the start of the annual coastal measurements in 1965). After removal of the system, the gained beach volume in the southern test area almost disappeared within a period of 1 year. The northern test area showed a remarkable stabilization of the beach volume during the test period after a beach nourishment in 2005.

The scientific research was focused on the possible working mechanism of the Eco Beach system. Several universities and scientists of different fields of specialism participated in the research. The indicated change in sediment properties in the intertidal zone had led the focus to the research on beach sediment. Based on grading analysis, a significant coarsening of the sediment was observed in the upper 2 m of the beach in the southern test area. A likely cause for the coarsening is the interaction between the groundwater flow and the phreatic surface in the direct vicinity of the drainage tubes. As the beach near the drainage tubes dries quicker, more fine sand will be transported to the dunes leading to coarsening of the active beach zone.

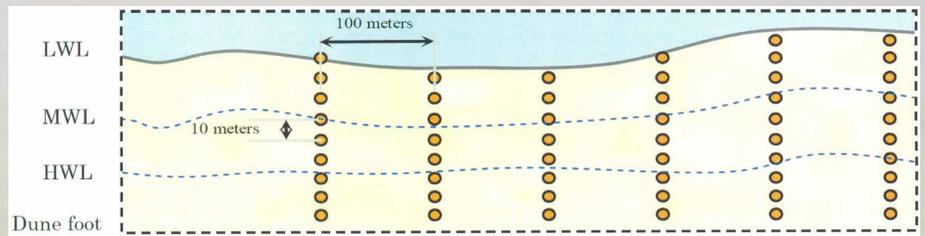
CONCLUSIONS

A significant increase in beach volume at the test area South has been found during the Eco Beach test period, while during this period the sediment of the test area South was significantly coarser than at the surrounding beaches.

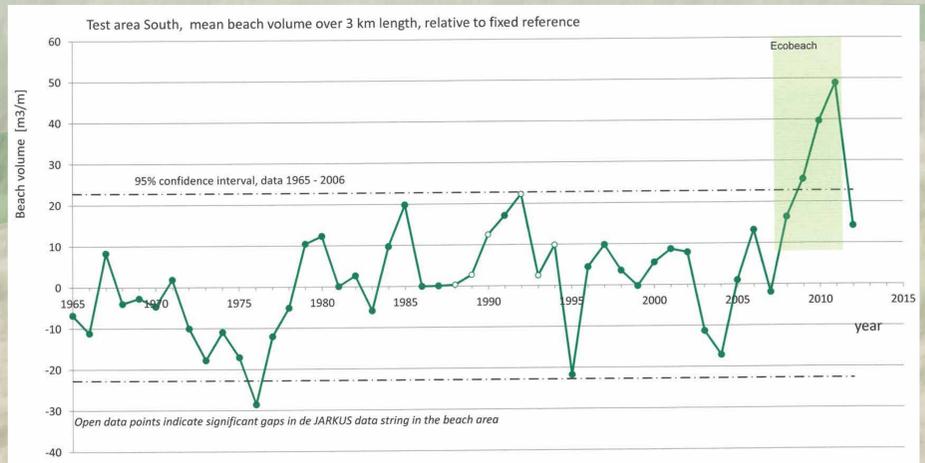
A combination of foreshore nourishments and the vertical beach passive drain system could affect the beach stabilization process positively. Coastlines susceptible to erosion would benefit the most.



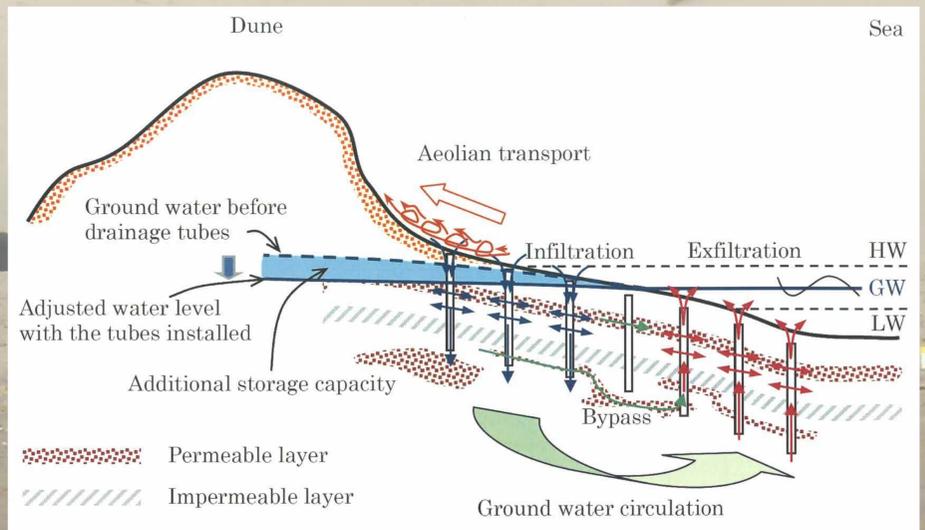
Location of the Dutch Eco Beach pilot project



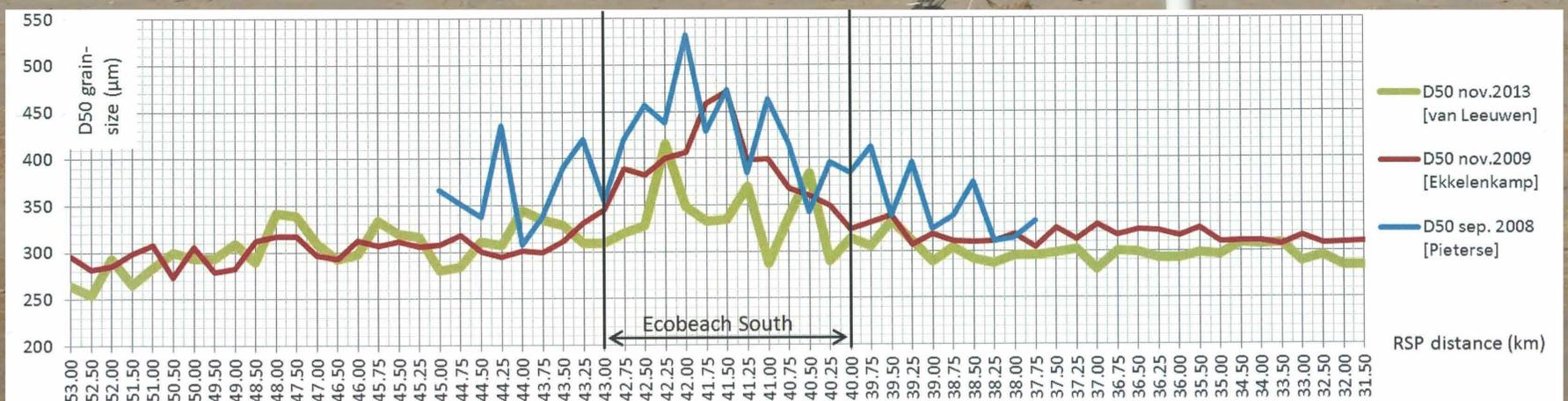
Placement grid of Eco Beach drains



Beach volume during the Eco Beach pilot in The Netherlands



The working mechanism of Eco Beach (Ekkelenkamp 2011)



Grain size D50 during and after the Dutch Eco Beach pilot

